COTTON

Volume LXXVIII
Number Eleven
Ten Cents a Copy

SEPTEMBER, 1914

Published Monthly by
W. R. C. Smith Publishing Co.
Dalton and Atlanta, Ga.

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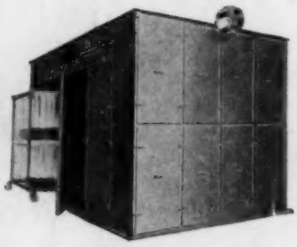

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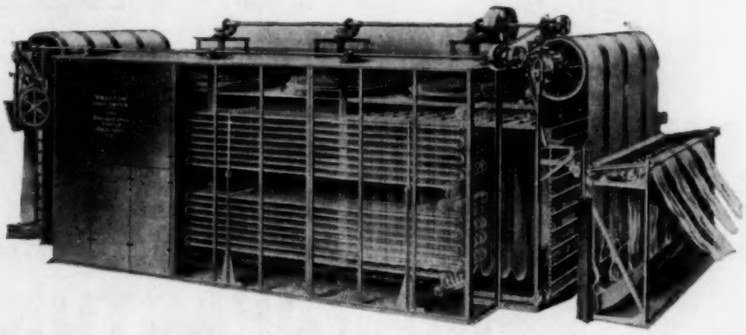

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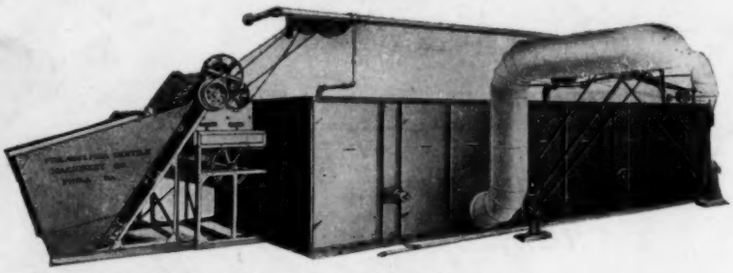

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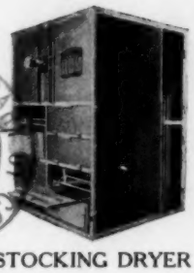

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COTTON

Published Monthly

Volume 78. **SEPTEMBER 1914.** **Number 11.**

Entered at Dalton, Ga., Postoffice as Second-Class Matter.

PUBLICATION OFFICE, DALTON, GA.

EDITORIAL and ADVERTISING DEPARTMENTS
GRANT BUILDING, ATLANTA, GA.

L. L. ARNOLD, Editor.

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SUBSCRIPTION RATES.

Domestic.....$1.00 for Two Years
Foreign.....$1.50 Per Year
Canada.....$1.00 Per Year

Complaints of failure to receive Cotton regularly or of errors of any nature relating to subscriptions should be promptly made to the Atlanta office.

Orders for any change in advertisements must reach Atlanta previous to the 10th of the month preceding month of issue, otherwise publishers cannot be responsible for changes.

This Issue 5,000 Copies.

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THE OUTLOOK.

War is a great destroyer. Ambitious rulers reck little the cost in human life or private property. The financial cost of the present conflict in Europe is reckoned in amounts beyond the grasp of the human mind. Billion dollar war funds are called for, acquired and squandered. Squandered in the supreme effort to destroy the lives and property of other nations of people. All this is being done to gratify the desire of a few men for greater power, higher honor and world-wide fame.

In the United States the financial and industrial features of the war naturally obscure the purely humanitarian viewpoint. We gasp with horror over the immense losses in human life recorded, and turn to our balance sheets and business plans. Not from any lack of sentiment, but because all kinds of plans and proposed changes must be abandoned or revised in view of the world-wide alterations now taking place in national boundary lines. Therefore, it is necessary as a matter of self-preservation to render to our business interests immediate and careful attention.

This country also faces another situation partly humanitarian and partly commercial. Before us lies perhaps the greatest commercial opportunity ever offered to a nation. Shall we take advantage of this opportunity and carefully and earnestly try to fulfil the requirements of other neutral countries, thus building for ourselves permanent foreign markets for the future; or shall we take advantage of their present difficult position and furnish their necessities at "war-time" prices, making for ourselves only a temporary market? This is a momentous question, as upon its decision rests the future of this country's export industries.

COTTON believes that united efforts should be made to utilize, so far as is possible, the raw products of these other neutral countries who have formerly depended almost entirely upon Europe for a market. Their accumulated stores of raw materials should be drawn upon liberally and in return should be furnished those manufactured articles formerly obtained by these neutral countries from European sources. That there may be no hint of our taking advantage of another nation's necessities, absolutely fair prices should be charged and careful attention given to their special requirements for finish and methods of packing.

Some time in the future, no one knows in just how many years, we shall have to stand our share of the enormous cost of this European war. Markets we have for years supplied will be weak in purchasing power, and in many instances practically pauperized because of the immense war taxes being levied and the enormous destruction of valuable lives and property. It therefore behooves us as a nation to improve the present opportunities offered to enter the export field and to do so with the determination to build for the future, that the lean years which are bound to come, may

be sweetened by business from markets acquired during the present period of strife and disaster.

Cotton.

Cotton conferences and financing schemes are the order of the day. One of the first of these was the Southern Cotton Congress at Washington, D. C., where a flood of suggestions and plans for meeting the situation were proposed by delegates to the congress. They ranged from proposals that the government valorize cotton, or issue currency against it, to plans for the destruction of half the crop, to maintain the price.

Representative Lever, of South Carolina, and Senator Hoke Smith, of Georgia, who have had charge of the legislative end of the movement to provide Federal aid to meet the situation, addressed the congress. They, with Senator Ransdell, of Louisiana, formulated a scheme which contemplates the establishment of standard cotton grades, government licensed cotton warehouses and the issue of sufficient emergency currency, about $300,000,000, to be loaned on cotton to enable the south to hold the surplus of the crop until market conditions become more nearly normal.

The congress adopted a resolution endorsing the amendments to the emergency currency act proposed by Senator Ransdell, which would make emergency currency available on warehouse receipts for cotton as security. Many other conferences have been, or are being held, the principal ones being at Atlanta, Macon and New Orleans.

Among the numerous opinions and suggestions that have been made on this all absorbing subject, one of the most interesting and lucid was that of THEODORE H. PRICE, of New York, who is a well known authority in cotton and finance. Referring to the emergency currency act proposed by Senator Ransdell, authorizing the emission of Federal reserve notes or Aldrich-Vreeland emergency currency against loans on cotton, he is not hopeful of much relief from this expedient, because the problem of providing storage and insurance on the immense amount of cotton that must be held seems an impossible one to him under present conditions, although the plan is receiving much support in the south.

It is a well known fact that most of the cotton that will shortly be marketed has been produced with borrowed money and unless the farmer can legally resist having his cotton taken for debt, he will have a poor chance to preserve its value. To provide the farmer with this legal right Mr. Price makes the following suggestion:

"The laws for the collection of debts are state laws and can be suspended by the legislatures of the various cotton states. It seems to me that the first thing necessary is that these laws shall be declared inoperative until the present emergency has passed. The farmer will then be able to hold his cotton without distraint and defer the payment of his debts, not as a matter of grace or suffrance, but as a matter of right. If he has the right he will exercise it, and the merchant who owes the money will in turn be able to defer payment without embarrassment or dishonor.

"Any shifting of the credits already established will be almost sure to result in trouble and a breakdown in the machinery of banking at some critical point.

"To preserve the *status quo,* and to do nothing or as little as possible, is the best possible course to pursue in the present situation, but as the privilege of inaction with regard to a maturing note can only be secured by affirmative legislation, the first essential is that the governments of the cotton states should declare a general moratorium until such time as Europe returns to sanity and trade again flows normally in its accustomed channels.

"England and most other countries of Europe have adopted this course and the south and the United States will do well to follow their example."

On another page will be found a complete discussion of this subject of a general American moratorium by Mr. Price and the attitude he has taken is indorsed by many business men.

On the other hand some of the leading bankers take the view that the present is an unexampled opportunity for demonstrating not only the purpose, but the ability, of the United States to maintain a credit, even in these perilous times, which would command the admiration of the civilized world. If we are able, bankers say, thus to protect our credit and to meet promptly our obligations the ultimate effect of all this would certainly be to the great advantage of American prestige, to our commerce, our export trade and would enable us the more easily to obtain large amounts of new capital which it would be necessary to obtain as soon as possible. They believe that if we can make arrangements for the speedy payment of immediate obligations we shall thereby strengthen our credit and protect American securities which are now held abroad to a certain extent. On the other hand if we postpone payment of our obligations now due, the effect upon our trade—especially with England, would for a long time be very serious.

While the prospects are not very favorable to cotton, it is probable that energetic cooperation on the part of all concerned together with the probability that England will take nearly, if not quite her usual quota of the staple, and the constantly growing consumption of American mills, will provide a market of sufficient capacity to prevent the panic prices predicted by some.

Cotton Cloth and Yarn.

The cloth situation is slowly improving, particularly along certain lines. The trade in sheetings being sustained by the demand for these goods to take the place of burlaps. Orders already placed up to the middle of August amounted to nearly sixteen million yards of from 2.50 to 4.25 yard 40-inch goods. Spot burlap holders are expecting higher prices and this, with the scarcity of jute, will undoubtedly force the big bag mills into the market for millions of yards of cotton cloth. It is estimated this trade will require 800 million yards a year. The fact that off-colored or tinged cotton would not affect the value of the goods for bag purposes, would seem to be favorable for the disposal of much of that quality of cotton produced in the last crop.

While the fine goods situation is full of uncertainties, still the market is calling for fine yarn goods to a greater extent than in many months. If fine lawns and organdies continue in demand, it will no doubt cause mills to increase their stocks of the quality of yarn utilized on this class of goods.

The probable readjustment of cotton goods prices to a lower raw cotton basis is one of the serious problems now threatening the trade. However, the sustaining efforts being made for the raw staple by practically everyone in any way connected with the cotton industry, may be successful in maintaining an equitable and fairly steady price. Such an event would prove of immense value in all quarters of the industry.

Yarn inquiries are reported good in some sections and slow in others. The finer end of the combed yarns seem

to be having the most orders at present, although some other mills report a good business. There has been some talk of curtailment, but such action has not become particularly noticeable as yet.

The effect of the war will undoubtedly prove stimulating to all yarn mills just as soon as those sections of the industry that buy and consume yarns recover from the first blighting effects of the financial and industrial shake-up caused by the announcement of the beginning of the European conflict.

Knit Goods.

The effect of the war on knit goods is shown in two ways: underwear manufacturers are greatly concerned over the effect on their raw material, cotton; while hosiery men are struggling with the shortage of dyestuffs question. The entire trade seems to believe that the war will temporarily restore the protection from foreign goods formerly provided by the tariff. They seem hopeful of increased domestic markets if the price of cotton can be maintained at a normal level, and other factors continue favorable for general prosperity throughout the country.

Very little interest seems to have developed at this time in the export markets the war has opened to us through the shutting off of German made hosiery. This is probably a wise decision on the part of the knit goods men, as credits in the domestic market are well established, which is not true of most of the countries to which we must look for foreign trade. Such credits are being established, however, and no doubt by the time the domestic markets are cared for, the export situation will be in better condition as to financial arrangements and transportation.

That they are fully conversant with their opportunities may be inferred from a recent statement by CHARLES VEZIN, of Hinchman, Vezin & Co., selling agents for a number of leading hosiery mills, who said:

"What has been the effect of the war on the hosiery industry? For a few days after Germany had declared war there was an anxious feeling and a few requests to suspend action on spring orders, but this is giving away to a feeling quite the opposite. We will shortly see a merchandise bear panic, the fear of an unprecedented shortage, which will greatly offset other influences. Germany is the great hosiery market for all the world, and there is no other source of supply except England, France, Japan and the United States. The production of the first three is barely sufficient for their home consumption.

"The fact that importations to the United States will be suspended is the smallest factor, for the United States has been fairly independent of the foreign hosiery manufacturer. Within a few days there has already sprung up an active demand from new sources for export."

Dye Stuffs.

A great many American manufacturers in the piece goods and hosiery lines are being adversely affected by the shortage in dyestuffs. From two to four months is the time variously estimated by mill men as the time they can run on present stocks. Because of this shortage the finishing companies are being overcrowded with orders due to the rapid shipping of goods on the part of those wishing to get any advantage possible while the dyestuffs and finishing materials last.

This problem of dyestuffs is a serious one with those manufacturers who have established a trade solely on the fastness of the colors used or on their ability to always match their standard shades. A change of dyestuffs under such trade conditions, presupposing other dyes to be obtainable, would be a difficult and somewhat precarious undertaking. Even the shade of blue used in stamping the grey goods at the mill must be retained, particularly in some far eastern export lines, otherwise a trade disturbance would be created with a consequent loss of orders.

Various suggestions have been made to improve the situation and some of the best minds in the country are devoting much time toward formulating a solution.

It has been proposed by E .H. HINCKLEY, the head of the dyeing department at the New Bedford Textile School, to adopt English dyes in the place of the German dyes heretofore used. He admits, however, that on fancy shades they will encounter difficulties.

Mr. Hinckley thinks that the demand will sooner or later bring into the market the patented English vat dyes now that the competition of the Germans has been eliminated and that we should receive satisfactory substitutes within the next six months.

There has also been considerable agitation tending toward the establishment in this country of suitable plants for the manufacture of such dyestuffs as are needed, it being claimed that American chemists could easily duplicate or replace the dyes used. In a recent interview on this subject J. MERRITT MATTHEWS, PH.D., discussed the situation fully, outlining its advantages and its difficulties and as a result of these investigations he says in conclusion:

"If necessity, growing out of a protracted war in Europe, demanded it, there is no doubt that our methods of distilling coal for the production of illuminating gas could be so modified as to form a coal tar suitable for the production of benzol and other intermediate products in the dyestuffs industry. It is all a question of dollars and cents."

One point has been demonstrated by the conditions at present existing and that is the importance of the little dye house which mill men are accustomed to relegate to some dark corner in the basement and look upon as an undue source of expense. These same conditions have also demonstrated the fairness and commercial honesty of the big color houses, some of whom portions of the trade were denouncing as trusts and robbers only a few months ago.

Export Trade.

Since the war begun there has been published many expressions of opinion from leaders in different manufacturing lines, all more or less optimistic as to the future of the export trade so soon as the immediate depression caused by the war shall have passed. Particularly has this optimism been evident when discussing the opportunities in South America.

That the opportunities are there no one can refute and in sending a number of commercial agents to assist in developing these opportunities, the present administration is showing its willingness to assist. Also a big step forward in the commerce between this country and Latin America was taken recently when the National City Bank of New York effected an exchange of credits with several banks in Argentina and Brazil. Figures furnished by the Pan-American Union show the imports of manufactured cotton goods into Latin America in 1910 to be as follows:

COUNTRY.	VALUE.
Argentina	$ 28,102,730
Bolivia	660,855
Brazil	18,085,000
Chile	9,652,305
Colombia	4,204,000
Costa Rica	883,282
Cuba	8,909,175
Dominican Republic	1,186,551
Ecuador	2,334,870
Guatemala	1,398,568
Haiti	1,099,355
Honduras	591,352
Mexico	8,778,832
Nicaragua	909,217
Panama	868,655
Paraguay	1,478,372
Peru	3,305,772
Salvador	1,771,764
Uruguay	4,549,694
Venezuela	4,296,840
Total	$102,067,189

When these imports are divided into countries of origin it shows the United States to be fourth on the list.

United Kingdom	$ 53,554,825
Germany	15,649,923
Italy	8,634,945
United States	8,292,717
France	6,451,660
Spain	3,566,316
Belgium	1,675,526
Portugal, Holland, Japan and all other countries	4,241,277
Total	$102,067,189

Reduced to percentages the figures indicate in a still more graphic manner the opportunities for increase.

Percentage furnished by the United States	8⅛%
Percentage from U. S. to Argentine	2.53%
Brazil	2.35%
Chile	4.62%
Cuba	11.95%
Mexico	8.92%

However, it will be well to remember that no person or nation likes to purchase goods without an opportunity for examination of at least a sample, therefore a traveling salesman or a resident agent would seem beneficial. Also the finishing specifications must be made satisfactory to the purchaser.

The following extracts from a letter by HOWARD AYERS, Secretary of the COTTON GOODS EXPORT ASSOCIATION of New York, in response to an inquiry from COTTON as to the immediate effect of the European war upon the exports of American cotton goods, would seem to give pause to the more extreme of the optimists who are pointing out the ease with which export trade may be obtained by indicating some of the difficulties to be overcome. Mr. Ayers says:

"It is almost too soon to answer your questions, for the events of the last two weeks have completely paralyzed all commercial and financial relations, and there is no precedent on which to base an opinion. The disturbance is so vast and so far reaching that no country remote or neutral is beyond the reach of its effect, and the adjustment to new conditions must be along lines not within the experience of the business men of this country and present day. We shall all know more in a few weeks.

"The immediate effect upon business in hand for export has been to stop all movement of goods. Steamers have been withdrawn from advertised voyages, marine insurance war risks have been at prohibitive rates, and financial facilities have necessarily been closed. It is difficult, if not impossible, for the present, for anyone to ship goods, by the operation of one or other of these factors, and the change in conditions that will reopen commercial communication must be awaited with what patience can be summoned. If the high seas are speedily made safe to neutral commerce, the risk of capture or other catastrophe of war so far diminished as to lighten the present crushing burden of extra marine insurance, and banks recover their financial and mental equilibrium, commercial operations can be resumed. When these desirable changes will be brought about must just now be merely an expression of opinion, but it is the high privilege of each one to indulge as much hope as the circumstances within his vision permit.

"Should the general war be prolonged, the interruption to all peaceful pursuits and the drain of artisans and resources will no doubt open markets new to the manufacturers of this country. There is a curiously sanguine expression of the hope of this advantage to be gained at once, that we have only to go out with our trade baskets to pick this pleasant fruit of the cultivation by others, now neglected. Trade worth having and likely to be retained is not to be secured that way. We must not only be able to supply what is needed, which may not be what is on hand or what our mills are accustomed to and prefer to make, but we must prove our ability to supply the trade on conditions as attractive as any ever afforded by others. All that can be expected is that we shall have an opportunity to demonstrate this where none could be secured before. There will still be the operation of economic laws, which no legislature or potentate has ever been able to suspend or override, and adjustment must be made within their reach. Much must be yielded of prejudice and probably something of profit, and cooperation of other instrumentalities must be cordial, transportation lines, banks and insurers. Manufacturers must not only be willing to make what the buyers in the hoped for markets want, but both for those new markets and the markets already served there must be a determined effort to maintain at their highest, the standards of quality and packing once established. The careless methods taken as a matter of course by the home trade will not be endured by buyers in foreign markets.

"It must not be forgotten that the far reaching effect of the stupendous cost of the present war, in the waste of accumulated capital and destruction of property and men, cannot be escaped by any country however far removed from the scene of conflict. The European countries involved will for a time, at least, lose much of the industrial prosperity that has furnished so constant a market for the products of other lands, where ability to import depends largely upon steady export. The purchasing power of the markets of the world will necessarily be adversely affected, and we may not be able to find such favorable commercial opportunities as must exist if we are to make the progress the most sanguine expect. Nevertheless, there will be some emergency orders that can be

filled, and the opportunity to enter markets hitherto beyond our reach will be worth an earnest effort to secure some new trade.

"Not least among the effects of so vast a convulsion, and beyond the lessened capacity to buy and do, is the change in the attitude and outlook of men individually and collectively. In no way is this shown more strikingly than in the reluctance to buy those articles of commerce that usually are considered necessaries, and the abandonment of works of constructive enterprise. The effect upon our home trade in cotton goods of some wave of commercial or financial depression is a common experience. In foreign markets the capacity to do without, stimulated by some cause, real or imaginary, is even more strongly marked. It cannot be that this war, which depresses all men everywhere sentimentally, and adversely affects them materially, will not make our excursions into new markets more difficult."

THE BALANCE OF TRADE AND THE TARIFF.

Professor Jenks, of the New York University, in his paper read at the National Foreign Trade Convention, said that the balance of trade ought not to be an academic dissertation, explaining what is meant by the balance of trade, but should, instead, deal with the chief influences that affect the relations between the quantities of commodities exported and those imported, and the effect of these influences upon the welfare of the country.

Broadly speaking, the old-time view, which regarded the accumulation of gold by a country as practically the sole means by which the wealth of the country is to be increased, has long since been abandoned; that gold is of peculiar importance to a country under many circumstances, and that its import and export will always be a matter of special interest.

It must be understood that in the long run the imports of a country, or their equivalent in some form, must be balanced by the exports; otherwise we should have the merchants of foreign countries making us presents, or our merchants would be making them presents, neither practice, it seems hardly necessary to say, being common on a large scale.

The many conditions of business which tend to make a change in trade relations either favorable or unfavorable are interesting, but space prevents their elaboration. Suffice it to say that if the United States imports goods from some foreign country, those goods must be paid for either in gold or in goods. There are, of course, many important invisible factors in trade relations, such as the payment of loans, the payment of interest, letters of credit, etc. Such sums run up into the hundreds of millions.

Outside of these invisible factors, it is interesting to know about the exports and imports themselves, as there may be less fluctuation than in the invisible factors.

From the Manufacturers' National Information Bureau of Washington we learn that the balance of trade is steadily running against us since the enactment of the new tariff law. The tariff bill was signed in October, 1913. In November we exported about $100,000,000 more of merchandise than we imported. In January, 1914, this excess of exports fell to fifty millions. In February the excess was but twenty-six millions, and in March the imports received came within five million dollars of equaling the value of the American product shipped to other countries. During the month of April the pendulum swung to the other side, and the amount of imports exceeded that of exports by over ten millions.

A very interesting result of the new tariff is our trade with Canada. She has increased the monthly amount of her products sent to the United States from eight million dollars to twelve millions, and during the same period of time reduced the amount paid to the United States for American goods sent there from thirty-three millions of dollars to twenty-six millions.—*Graphite.*

JAPANESE COTTON GOODS IN MANCHURIA.

The only noteworthy feature of the Chinese customs returns for the quarter ended March 31, 1914, showing imports of merchandise via Dairen (Dalny) is the steady increase in receipts of Japanese cotton goods. This increase has been sufficient, in spite of the one-third reduction in duty allowed on goods brought by rail through Chosen, to double the revenue received by the customs. With the new decrease in freight rates allowed by the South Manchuria Railway on goods entering Manchuria by rail via Antung, it is expected that the increase in imports will be even greater.

Comparative statistics of imports of certain lines of cotton goods during the first three months of 1913 and 1914 follow:

Articles.	1913.	1914.
Shirtings, gray	Pieces.	Pieces.
American	.....	480
English	801	1,595
Japanese	82	6,242
Sheetings:		
American	.....	7,700
English	.....	940
Japanese	7,508	807,581
Drills:		
American	.....	1,580
English	.....	30
Japanese	2,128	53,779
Jeans:		
American	.....	200
English	1,805	4,220
Japanese	.....	26,537
Japanese cotton cloth	*a*39,939	*a*1,966,196
T cloths, Japanese	10	236
Cotton flannel, Japanese	100	272
Cotton blankets, Japanese	4,823	19,119
Handkerchiefs, Japanese	*b*352	*b*2,979
Towels, honeycomb and huckaback, Japanese	7,416	14,878
Cotton yarn:		
English	.....	*b*28
Indian	.....	*b*30
Japanese	*c*232	*c*11,062

a Yards. *b* Dozens. *c* Piculs (133⅓ pounds).

Other leading imports of cotton goods at Dairen for the first quarter of 1914, the origin of which is not shown in the summarized returns, were: White shirtings, 26,929 pieces; fancy woven cottons, 271,199 yards; velvets and velveteens, 34,724 yards.

An American Moratorium—Is It Expedient?

BY THEO. H. PRICE IN "COMMERCE AND FINANCE."

An American moratorium is, in the opinion of many thoughtful men, a national duty in the present situation. It is urged in the interests of humanity, of the fiduciary institutions of finance who are the custodians of credit and of all the people, as opposed to the small minority of the creditor class who, possessing the legal power to compel the payment of debts in a time like the present, can use that power to acquire the property of the masses by foreclosure at a terribly depreciated valuation.

A moratorium practically prevails throughout Europe. It has been legalized in England, France and Belgium and is no less effective in Germany though the latest news does not indicate that it has yet received official recognition.

The United States owes Europe an amount variously estimated at from three to five billion dollars, represented chiefly by the value of American securities or evidences of American debt held abroad. These securities are about the only salable assets the nations now at war possess. If they cannot be converted into money, the ability to continue the war is to that extent impaired and there can be no doubt that our national duty to humanity is to do all in our power to bring hostilities to an end

The action of a banker who refused to honor the checks of a mad depositor known to be burning up his money would undoubtedly be approved by public opinion and the courts. In its International aspect, an American moratorium would be much the same thing.

President Wilson is already on record as opposed to the negotiation here of any loans to the belligerent powers; and a moratorium, which would defer the payment of debts due to Europe, would be but an extension of the same principle.

If the newspapers are to be believed, the German General Staff has announced that it is willing to sacrifice the lives of one hundred thousand men to capture Brussels and it is becoming evident that the frenzied desperation of the powers now at war can only be checked by the lack of food and money.

These things America and America only can now supply in any quantity. If we refuse them the straightjacket of starvation and bankruptcy will soon render the armies of Europe impotent for the destruction of either life or property and we will have done more than we could in any other way to hasten the return of peace and check the waste of war.

No one doubts the solvency of the people of the United States collectively; and a refusal to pay upon the ground that our creditors if paid would only use the money so obtained for the destruction of life and civilization would not in the least effect our honor or our credit.

Such are the grounds upon which the humanitarian advocacy of an American moratorium is based.

The protection that the proposed suspension of the collection laws would give to the fiduciary institutions of finance, including state, national and savings banks as well as trust and life insurance companies is a dual one. It would enable the banks to protect their gold reserves and it would probably avert a further decline in the price of the securities owned by these institutions and by the market value of which their solvency is measured.

The savings banks of New York State have about $1,800,000,000 of deposits largely invested in securities which if sold at the prices current July 30th would not yield a sum equal to their aggregate liabilities. The life insurance companies are in the same predicament. The trust companies and other banking institutions have enormous sums loaned upon securities that cannot now be sold or if sold at the prices theoretically obtainable July 30th would not realize the amount loaned upon them.

Whether the stock exchange reopens or not, the American securities held in Europe will somehow be sold if it is possible to obtain gold for them and the action of the Bank of England in making the Canadian Government at Ottawa a depository for the gold that it proposes to demand of those who owe, or may owe money payable abroad, means, and can mean only that our supply of gold is to be depleted just as rapidly as we will permit.

It is futile to think that we can or will be able to ship wheat and cotton to Europe fast enough to pay for all the securities we will have to buy once it is made possible for the sellers to demand that gold shall be shipped to Canada in settlement for them.

Despite the well-meant efforts of the Stock Exchange authorities, an informal securities market has already developed. It is uncontrolled and if it becomes generally known that the banks will pay out gold for the proceeds of securities sold here by foreigners, we will speedily be inundated with enormous offerings for European account.

Thus far the banks have themselves enforced a moratorium in regard to the payment of cash. The savings banks are requiring the sixty-day notice of withdrawal and other deposit institutions are refusing to make any substantial payments except in "clearing house funds" which are simply transfers of credit. These expedients are adequate as long as we are not menaced by by an admitted obligation to pay foreign creditors in gold, but the moment we undertake to do this the disappearance of our gold supply will commence and will be greatly accelerated by the emission of the emergency "Aldrich-Vreeland" currency, a billion of which is already authorized. We will then be confronted with the necessity of either suspending specie payment or declaring a moratorium which, if earlier established, would undoubtedly avert much of the harm that is certain to result from delay.

Finally there is to be considered the interest of the thousands of people who owe money as against the much smaller number who are lenders. Thus far it is to the credit of the banks and the lenders generally that they have acted considerately, but they are under great strain; the officers of banks are trustees of other people's money and in a situation like the present it is their duty to collect debts whenever it is possible to do so. The result is

a constant and a mild persistence in demanding payment that puts the man with small resources at the mercy of the larger capitalist.

Where the lender is avaricious and the borrower proud or sensitive in regard to his credit or the acceptance of financial favors, a situation exists that is almost certain to result in increasing the wealth of the creditor at the expense of the debtor.

A case of this kind came under our personal observation during the last few days. A small but well-to-do merchant had, upon the advice of a bank president, invested $10,000 in the stock of a company that was exceedingly prosperous and was paying ten per cent. upon the amount invested.

In order to pay for it he had borrowed $7,500 from the bank whose president advised the purchase. The note became due and a renewal was refused him. He tried to borrow the money elsewhere unsuccessfully, but in a day or two was approached by a broker who said that he thought that he could find a buyer for the stock at $8,000. Worried and harassed and never before having failed to meet an obligation at maturity, he sold the stock only to find out later that the buyer was his friend the bank president, who had originally advised the purchase and had drawn upon his balance in the lending bank to pay for it.

Legally the bank president and the bank were quite within their rights and the borrower acted entirely as a free agent both in the purchase of the stock and its subsequent sale at a loss of $2,000.

Ethically, however, the refusal to renew the loan is indefensible and the borrower, who could ill afford the loss, would probably have been able to avoid it if a moratorium had made it unnecessary for him to realize on his security when credit was practically unobtainable.

There probably have been many such experiences during the past few weeks and as the autumnal maturities of commercial paper approach there will probably be many more unless men shall be given the legal right to defer payment at a time when payment is impossidle.

The maturity of a very large portion of the world's commercial obligations is now synchronous with the marketing of America's crops during September, October and November. The mass of contracts which must directly or indirectly be liquidated by the payment of money within the next three months is enormous.

If this liquidation is to be accomplished without a breakdown of our credit machinery that will throw America into panic, unnecessarily depreciate our debt paying power and utterly impoverish all but the immoderately rich, time must be had, not as a matter of grace and sufferance, but as a legal right in the face of conditions undreamed of by those who framed our laws and devised our credit machinery.

The emergency is close at hand and it will take time to provide for it. Unfortunately it is not within the Constitutional power of the President or Congress to suspend the operation of the laws for the collection of debt.

The states alone can do this. Under the circumstances it would seem to be in order for the Governors of the various states at once to get together and carefully consider a subject that is of such vital importance to the people generally and to the people of the agricultural states in particular.

Fall Convention Announced.

The fall convention of the National Association of Cotton Manufacturers will be held Tuesday and Wednesday, September 29 and 30, at the Hotel Aspinwall, Lenox, Mass. A special train will be provided from Boston and other eastern New England points arriving at Lenox in ample time for the president's reception and opening session to be held Tuesday evening.

One session for the reading of papers and transaction of business will be held Wednesday morning, the afternoon being open for golf and other sports, and a banquet to complete the formal program is to be held Wednesday evening with addresses by one or two speakers of national prominence.

Southern Textile Association.

E. E. Bowen, of Greer, S. C., president of the Southern Textile Association, has announced the various committees of the organization that are to have charge of arrangements for the next meeting of the association and other matters:

ARRANGEMENT COMMITTEE.

Alonzo Iler, chairman, Greenville, S. C.
D. R. Harriman, Jr., Greer, S. C.
J. S. Palmer, Birmingham, Ala.
Frank E. Heymer, Alexander City, Ala.
C. H. Goodroe, Yazoo City, Miss.

PROGRAM COMMITTEE.

James A. Greer, chairman, Charlotte, N. C.
J. M. Davis, Newberry, S. C.
J. M. Alexander, Pelzer, S. C.
A. H. Cottingham, Union, S. C.
L. O. Bunton, Belton, S. C.

PUBLICITY COMMITTEE.

A. E. Escott, chairman, Charlotte, N. C.
L. L. Arnold, Atlanta, Ga.
F. G. North, Atlanta, Ga.
L. P. Hollis, Greenville, S. C.
Robert F. Bowe, Greenville, S. C.

The next meeting of the association will be held in Birmingham, Ala., some time in November of this year.

Three bulletins of practical value to the American manufacturer and exporter of cotton goods have just been issued by the Bureau of Foreign and Domestic Commerce, Department of Commerce, as the result of a first-hand study of market conditions in East and South Africa by Commercial Agent Ralph M. Odell. In his investigation of this field Mr. Odell ascertained: First, what American exporters have done and are doing, and, second, the opportunities for extending their trade and the best method of going about it. Copies of the bulletins may be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C., at the following prices: Special Agents' Series No. 80, British East Africa, Uganda, German East Africa and Zanzibar, 15 cents; No. 82, Portuguese East Africa, 10 cents; No. 83, South Africa, 10 cents.

When taking charge of any equipment, examine it carefully and report any breaks or defects, otherwise you will be held responsible.

In replacing belts adjust them on the driven pulley first.

South American Trade Conditions.

BY HON. JOHN BARRETT, DIRECTOR GENERAL OF THE PAN-AMERICAN UNION.

As the executive officer of the Pan-American Union, the organization of the American republics devoted to the development of commerce, friendship, intercourse and good-will among them all, I appeal to the banking, shipping, manufacturing, exporting and importing interests of the United States to give at this moment every possible aid and attention to the critical South American situation brought on by the European war.

While everybody must profoundly regret that a condition of war and the sufferings of European nations engaged in a great conflict should in any way be exploited for the selfish gain of the United States, its business interests have a duty and responsibility in this crisis which must be met even if it may bring them vast material benefits. Looking at the situation in a thoroughly unselfish way, it presents demands upon the United States from South America which can not be neglected, but which, if responded to in the right spirit, will be enormously beneficial to South America and the United States alike. The problem divides itself into four heads—imports, exports, ships, and loans.

South American Imports. All South America is an enormous purchaser of the manufactured products of Europe. A large portion of this supply will be shut off during the next six months and possibly during the next year or two if the war continues. As many South American countries depend largely upon Europe for their absolute necessities, and a major part of these orders are placed but a short time ahead because of the excellence of the regular shipping facilities, they are now face to face with an immediate famine in the articles which they most generally import. According to the latest available figures collated in the Pan-American Union, the ten South American countries—Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Paraguay, Peru, Uruguay and Venezuela—annually import products valued at $961,000,000. Of this there came from Europe products valued close to $660,000,000. While Great Britain supplies products of this total to the value of approximately $273,000,000, Germany, which is completely cut off by war, supplies $180,000,000; France, $84,000,000; Italy, $54,000,000; Belgium, $47,000,000; Austria-Hungary, $8,000,000; Netherlands, $8,000,000; Switzerland, $6,000,000, and other European countries lesser sums. For comparison it can be stated that the average imports from the United States of these ten countries of South America amount to approximately $155,000,000. Bearing the fact in mind that the commercial relationship of South America and Europe has been so well organized and systematized that seventy-five per cent of these imports are only ordered about a month or two months ahead of their delivery, it can be realized how soon the present supplies on hand in South America will be exhausted and that she must depend upon the United States to make up the deficiency. If the United States manufacturers and exporters will exert every effort to supply this emergency demand without increase of prices, or unnecessary delay they will accomplish great permanent good for themselves and the South American business interests alike.

South American Exports. The same compilation of figures shows that South America annually exports to foreign countries products valued at approximately $1,177,000,000. Of this total nearly $700,000,000 go to Europe. Of these products Great Britain takes approximately $270,000,000; Germany, $157,000,000; France, $104,000,000; Belgium, $60,000,000; Netherlands, $44,000,000; Italy, $27,000,000; Austria-Hungary, $22,000,000; with the remaining amount divided among different countries. For comparison, it can be stated that these ten countries of South America export to the United States annually products valued at approximately $250,000,000.

With, therefore, their principal markets for their raw products temporarily closed against them, these ten countries are looking for a place to dispose of their accumulating stores, and if the importing interests of the United States, including the manufacturers of raw material, can relieve the situation by increasing their purchases they may save the South American business interests from a financial crisis.

Ships for the South American Trade. As nearly ninety per cent of the exports and imports of these South American countries are carried in German, British and other European bottoms, which are now withdrawn from the sea, all of their principal ports, like Rio de Janeiro, Montevideo, Buenos Aires, Valparaiso, Callao and La Guaira are in a state equal to that of a formal blockade. The majority of these vessels will be absolutely unable to operate for many months and possibly for several years unless the situation is quickly remedied. There is no limit to the sufferings that will come to these countries and ports if their facilities for sending out their exports and bringing in the necessary imports are cut off.

National Loans. Just as war was declared several of the principal countries of South America were negotiating loans in the European financial capitals. These loans are inspired by the pressure of local conditions and are absolutely necessary for the welfare of countries concerned. For the present and probably for a long period it will be impossible to float such loans in Europe. Under the circumstances these governments will naturally turn to the banking and financial interests of the United States which heretofore have seldom subscribed for South American loans or shown much interest in them. By endeavoring to help out these governments in this crisis, they can not fail to perform not only a great service to such governments but place themselves in a favorable position to obtain other loans in the future and favorable consideration from the governments concerned.

In conclusion, it is gratifying to state that the Department of Commerce of the United States with commendable energy has already started an organization to relieve this situation, but far reaching results can only be accomplished by the direct action and interest of the entire financial and

commercial interests of the United States; and if the Pan-American Union can give any information which will be helpful to those who may be interested, it will be glad to supply all the data within its power.

THE HETRICK HOSIERY MILLS.

One of the most complete manufacturing plants of its kind in the South is that of the Hetrick Hosiery Mills, of Walhalla, S. C. One can scarcely realize that the plant is the same as that established a few years ago—and, in reality, it is not the same, except as to location. From the basement to the top floor it has been thoroughly overhauled; new machinery has been added, and everywhere is apparent the very best that is afforded in the way of raw materials, machinery and equipment.

One of the most noticeable improvements, however, is the box-making department, where every box used by the plant is manufactured, the machinery being adjustable to the needs of the concern. A call from the shipping department for the smallest or the largest size of box used in the packing of hosiery into dozens or half dozens meets prompt response from the box-making rooms, and almost faster than you can count the sheet of boxboard is started from the first stage in its course, never stopping except in transfer from one employee at his or her machine to the next in the process of manufacture. And it is a remarkably short interval from the time the big sheet of boxboard is started on its course until it ends its journey, being transformed into a neat and strong box, handsomely covered with bright, glistening paper to meet the ideas of the wholesale purchaser. Not only are the cardboard boxes made on the spot, but every wooden shipping case is made under the roof of the main plant.

One of the most recent additions to the place is the installation of the fire protection system. The entire mill is now fitted up with an automatic sprinkler system. The first evidence of this greets the visitor outside the mill in the shape of a 30,000-gallon water tank.

The feature that strikes a visitor first and most forcibly in going through the Hetrick mill is the thorough ventilation of the operating rooms; the absence of any lint; the good light that is provided by the systematic arrangement of the machinery to secure the best results from the ample window space, and the comparative silence that pervades the place in spite of the fact that hundreds of machines are everywhere whirling and twirling in their rapid and almost magic movements as they carry the numberless threads of yarn on their way from the spool to the completed stocking. As the girls and young women move from one machine to another, or sit at their sewing and welting machines, each gives the appearance of simply being one member of a great family going about some duty in the sewing room of a big household. The gentle whir of the knitting machinery is such as to make one feel like humming a merry tune to keep in touch with the seeming joyful spirit of each of these busy little knitters. It is an ideal place for the men and women, boys and girls who work. The whole tone of the place is on a high plane, and in looking over the plant as it moved so smoothly we could but think of the boon it has been in furnishing a healthful and remunerative employment to the people of our community.

Today the plant has on its payroll about 100 operatives, and every month upwards of $2,000 are paid out to the employees in return for services rendered.

Every employee in the mill is daily working on the "piece system"—that is, the operatives do not receive so much a day, or week, or month, but every one draws his or her pay in proportion to the work done. This is the most equitable compensation possible, putting a premium on speed and accuracy, and reducing to a minimum the operations of the "drone," for in this plant there is no place for the drone. It is essentially a "hive" of as busy, neat and energetic human bees as can be found anywhere. Every operative with whom we spoke had a cheerful voice, a bright smile, and seemed thoroughly in love with the particular branch of work in which engaged.

Altogether the Hetrick Hosiery Mills is a plant of which this community may be justly proud. It is well worth a visit from anyone who feels an interest in the activities of business. This plant is now disposing annually of about $125,000 worth of hosiery, which goes to all parts of the United States, with some shipments to foreign countries. The entire product is sold through the large commission house of Hinchman, Vezin & Co., 349 Broadway, New York City.

The plant is located on the side of the Blue Ridge Railway right-of-way, just at the limits of the town, on the east, the mill property including thirty acres. There are twenty houses on the property for operatives exclusively, these ranging in size from four to six rooms each, and, in addition, there is a large ten-room boarding house, which is now occupied and is being run for the benefit of those operatives who have no families. Every house has ample ground, each having its little garden spot, and at almost every home there is at least one cow. The company has fifteen acres fenced off for pasturage, and the privilege of pasturing the cows is given to the operatives free of charge. The property contains ample shade, there being portions of the tract well timbered.

It is the intention of the management to erect a school building in the near future, so that the operatives may have the advantages of a good school close at hand. So soon as this arrangement can be carried out, the services of a competent teacher will be secured. The children of the knitting mill village are of sufficient number to require the services of a good teacher in ample quarters.—*Keowee Courier.*

The general decreases in most lines of cotton goods in China, not only American, but also those from other sources, may be attributed largely to local financial conditions. No business was done in cotton goods during 1913 by the British-American Tobacco Company, which in 1911 undertook to act as an agency for American manufacturers in this line, as the enterprise, at least in this district, was abandoned during the preceding year.

As a basis for his discussion of the cotton goods business, Ralph M. Odell, in a recent bulletin, gives a general statement as to the commerce of the countries, thus furnishing the reader an idea of the fundamental trade conditions, while to make the bulletin of definite practical value, he has collected hundreds of samples of the goods sold, with a statement as to their construction and the wholesale and retail prices.

Mill Conditions and Market Reviews.

SOUTHERN MILL SITUATION.

It would certainly seem that the country is on the eve of a change for the better, but it would be imprudent to assert that the turn of the tide has yet come. Were it not for the lack of confidence arising from legislative uncertainty, and the general slackness of trade, business in practically all lines would undoubtedly show more resiliency, as a result of cheap money and expected large crops, two factors which usually act as a powerful stimuli upon all business. By far the most encouraging factor in the general situation is the crop outlook, which continues, with few exceptions, eminently satisfactory.

Our foreign commerce returns for the fiscal year ending June are, on the whole, rather discouraging. Our exports were valued at $2,364,000,000, while in 1913 they amounted to $2,465,000,000. Our imports during the twelve months amounted to $1,894,000,000, beating all records, the best previous year being 1913, when the total was $1,813,000,000. This increase in imports was undoubtedly due largely to the lowering of the tariff, which manifested itself with increasing force during the first six months of 1914. However, the comparison of two successive years is almost worthless, as, sometimes for years, the fluctuations of imports are so great that any attempt to jump at broad conclusions from a single instance of the kind is purely guesswork. Even if the statistics do show how the new tariff has been working for the past few months, it would still be rash to judge of its lasting results from so brief an experience. However the direct effect of the European war will be to grant a certain amount of enforced protection, while at the same time it will tend to open to our manufacturers the vast markets of Latin America.

Final agreement on a bill to tax out of existence so-called gambling transactions in cotton futures was reached on July 24th by House and Senate conferees at Washington. Under the measure all future contracts which do not provide for delivery of spinnable cotton of a designated quality under standards to be established by the Department of Agriculture, would be subjected to a tax of $10.00 a bale. No tax would be imposed on future transactions which come within these requirements, or upon trading in spot cotton. It is said that this would mean an annual saving to southern farmers of nearly $100,000,000, and would increase our foreign trade by more than $40,000,000 a year. The rate of taxation has been increased from $5.00 to $10.00 a bale, to make more certain the elimination of gambling from cotton exchanges. Under the new arrangement, all future contracts would be registered with the Treasury Department, through which the public would be informed of the quantity and nature of the business transacted by the various exchanges. One provision that is noted specifically bars delivery on contract of "rejections," "dog-tails," and other qualities of cotton unsuited for spinning and of a staple of less than seven-eighths of an inch.

J. C. SAUNDERS, Manager of the Bonham Cotton Mills, Bonham, Texas, and President of the Guadalupe Valley Cotton Mills, at Cuero, Texas, said to COTTON'S representative, in a recent interview regarding mill conditions in Texas:

"I can not say anything concerning business conditions in this section that is not almost threadbare and well known to other sections of the South that are engaged in cotton manufacturing. The cotton mills of this section are small and rather poorly equipped to stand the strain of competition that has been the mill man's burden for the last three years. We have higher labor, higher fuel and more freight to pay than southeastern mills, with but one single advantage in the way of freight rates to Texas and southwestern territory.

"The management of the southern cotton mills are largely interested, directly and indirectly, in the growth of cotton, and they have been an important factor in assisting the public and the speculators in boosting the price of the staple up to its present level. In return for this favor, the farmers, the public and speculators have unloaded the cotton on the mills, while the buyers of merchandise the world over say cotton and merchandise are too high, and the mills are forced to take all the loss. The farmers, speculators and public then get ready to boost another crop and make the mill men take it at a higher level, because he is fed with the idea that if he does not buy it now it will all be gone and he will have to close down his plant. The world has been taught to believe that it consumes a crop of 15,000,000 to 20,000,000 bales of cotton, when in reality it has simply transferred the greater part of it from the farmers' hands into the hands of the speculators, who in turn unload it on the mills.

"The so-called consumption of merchandise is juggled in about the same manner. Under the impetus of boom times, the jobbers, brokers and dealers throughout the country load up pretty heavily on merchandise; this transfers it from the mill warehouses, and the word immediately goes out there is a great scarcity of merchandise. Mills begin to run night and day and load up their own warehouses and get every channel congested, with the result that in a very few months from the time when there was a dearth of goods, we find the mills unloading their product at a loss; in fact, running "foot races" with each other to see which one can sell the cheapest. Thus we learn the cotton and goods were not consumed, merely changed hands, but we soon forget this, and really act like we think they were consumed.

"I believe there have been very few days during the time that cotton has been selling at 12 to 15 cents that a mill man could buy this cotton and make contracts for his products that would show a reasonable profit on his investment, and surely the records do not show that mills generally have been able to buy the cotton at prevailing prices without in most cases showing a loss for their owners. This is not right, but there is no use howling about it, for so long as we are willing to operate our mills in this way the world at large is willing, although they will heap abuse on our tombstones for not having more sense.

"The cotton mills in this section have been trimmed up about like the old confederate wanted to see a yankee trimmed. With high cotton, sentimental legislation and every element of cost mounting higher all the time and while the world gets its products at less than cost, the industry is fast getting into a deplorable state.

"As it is illegal to have any character of combination, then it must be changed by individual efforts, if at all, and this seems as remote as universal peace."

A number of other mill men interviewed thought that the European war would have a stimulating effect on business in this country, among them being T. N. WEBB, Treasurer of the Bellevue Mfg. Co., at Hillsboro, N. C., who stated that it certainly seemed as if the cotton manufacturers in this country would be greatly benefitted by the situation.

In a recent issue of the Greensboro News, in spite of some doubtful attitudes regarding the good that will come to business, especially in the South as a result of the wars of the nations of Europe, quite an optimistic outlook is held by JULIUS CONE, of the Proximity Manufacturing Company, who believes that ultimately American products and American business will flourish greatly as a result. While he realizes the tie-up of international trade will likely continue until the war is ended, annulling the demand in Europe for American goods, he sees beyond the war a greater demand than has ever been known, offering a wonderful future for those men of this country who may be substantially fixed.

One difficulty that the mills which manufacture colored goods are facing at present is a lack of dyeing material. Mr. Cone stated that from 75 to 90 per cent of this is made in Germany, and he hardly supposed that on an average the supply is enough to last over sixty or ninety days at the outside. Under this difficulty his mills will be unable to make denims. However, Mr. Cone believes that if the war keeps on, the United States will get all the German and English trade in South America.

An effort is being made by southern cotton mill interests to deflect Commercial Agent Ralph M. Odell, from the far eastern markets to South America, where the opportunity right now is said to be so much richer. This trade, which has heretofore been controlled largely by German and British interests, is the natural field for American enterprise, and the European crisis now pending is said to have made the opportunity one of extraordinary promise. Southern cotton mills have a large interest in this field, hence the effort on the part of leading manufacturers to send Mr. Odell there to canvass the field.

A meeting of the Board of Governors of the American Cotton Manufacturers Association was held at Asheville, N. C., on July 22nd. The session was an executive one, and no account of what transpired was given to the public. It is understood that the Board will probably wait until later in the fall to select a place for the next meeting.

On August 5th the Southern Hard Yarn Spinners held a meeting at Greensboro. No statement as to what transacted was given out, and while there was speculation that the Spinners discussed their business in the light of the war situation abroad, it became known that the call for the meeting was issued before the war.

The following proposed additions and changes are noted:

The Orion Knitting Mills, of Kinston, N. C., will establish a branch hosiery plant at Beaufort, N. C. This company is at once to proceed with its plans, intending to erect a temporary frame building and later erect a brick structure, 40 knitting machines to be the initial equipment.

The Alden Mills, of New Orleans, La., have decided upon the construction of an $18,000 building addition to their plant. Plans and specifications are now being prepared, and the erection contract is expected to be awarded soon.

The report that the Exposition Cotton Mills at Atlanta, Ga., was to build a three-story addition to the mill was an error. The intention was to build a three-story warehouse 100 by 93 feet, but because of the uncertainty engendered by the European war, this project has been indefinitely postponed.

The Rushton Cotton Mills, Griffin, Ga., are planning to add about 15,000 spindles, with accompanyment equipment. This mill is now operating 14,752 ring spindles, and 394 looms on domets and fancy dobby weaves.

The Limestone Mills, at Gaffney, S. C., have increased their capital stock from $200,000 to $250,000, presumably to add to their equipment. This mill now manufactures drills, sheeting and print cloths.

The managers of the Willingham Cotton Mills, Macon, Ga., state that they will make no addition to their mill in the immediate future, recent reports to the contrary being in error.

The Eureka Cotton Mills, Englewood, Tenn., are planning to about double their capacity on knitting yarns.

The Mayes Mfg. Co., Maysworth, N. C., are building a three-story addition to their plant, which when completed will be used for winding, finishing and packing machinery, which will be moved from the present building. About 4,000 or 5,000 spindles, and about 1,500 twister spindles will be installed in the space left vacant by the removal of the old machinery.

An addition is being built to Mill No. 1 of the Efird Mfg. Co., at Albemarle, N. C., in order to increase the carding capacity, and on its completion several new cards will be installed. This mill makes hosiery yarns, 14's to 24's.

The Tarboro Cotton Factory was bought by Henry Staton, New York, for Messrs. L. L. Staton, Job Cobb and E. V. Zoella, all of Tarboro. This mill was formerly in the hands of a receiver, but is now being partly operated, and the new owners intend to reorganize, improve and operate the plant to its full capacity when the new crop of cotton becomes available this fall.

NEW ENGLAND MILL SITUATION.

One month has seen the most radical change in the situation and outlook for mills in this country that the world has ever known. The financial cataclysm following the declaration of war in Europe cannot be measured even at this time although some repair work has been done. That cotton will be low, perhaps too low for the good of the whole country, is now very generally feared. The shutting off of shipments to foreign markets has been overbalanced in part by the shutting out of foreign products, yet out of it all have come some exceedingly bright prospects provided it is possible to keep our own country out of foreign political and militant entanglements.

At the present moment mills are proceeding more cautiously than the prospects for trade warrant, largely due, of course, to the shutting off of supplies of dyestuffs. Taking the bank clearings as a measure of the fall in distribution, it is assumed that 20 per cent of the consumption of the country has been halted. The shutting off of export trade is but temporary, and there can be no normal resumption of import cotton goods business for many months, even assuming that the war ends in another 30 or 60 days. Should the present prospects for a very low priced cotton crop continue, distributors of merchandise

will have to count upon a greatly reduced purchasing power in the southern cotton belt. This is a factor of so much importance in merchandising just now that the best thought of the trade is being given to restoring confidence among the southern retail and jobbing factors.

The most serious fall in prices for goods has been in the wide print cloth division. It has been led and conducted very generally by New York influences and most New England print cloth mills have declined to sell goods at the prices New York agents of many southern mills have been willing to accept.

At this writing, 38½ inch 64 x 60s are quoted at 41¼ cents, which is ⅝ cent a yard down in a month. For 39 inch 68 x 72s, some mills have accepted 5¼ cents on contracts to run to the end of the year. A month ago 5⅞ cents was asked. Regular print cloths have dropped ¼ cent a yard. All print cloth yarn goods have not followed this lead, as several constructions of sateens, twills, and specialties for the lining and bag trade have sold at as good prices as those current a month ago. Very few New England mills will enter upon contracts for any sustained period. Despite the great decline that has occurred there are many manufacturers who believe print cloths will react upward sharply within 60 days, whatever the course of cotton markets may be.

The reasoning on which a rise in the near future is based is substantially as follows: Sheetings have not suffered the decline seen in print cloths and there are many signs tending to show that they may hold their values steadily. This is due, of course, to the very broad demand that has been seen for heavy sheetings to be used in place of burlaps. Fine cotton goods have been advancing while print cloths have been declining. They are now in steady demand and fine goods mills are generally feeling better than for many months past. With sheetings holding steady and fine goods advancing, it is not thought likely that print cloth yarn goods will suffer, only during the time it will take to readjust the relations of current product to the new export demand that is surely ahead, and may come quicker than manufacturers are thinking about.

Were the dyestuffs and shipping complications adjusted, and either is not insuperable, the one thing that would hold export demand back would be the financial situation in foreign countries. Steps have already been taken by one leading bank to furnish direct credits to American merchants who wish to do business with Argentina, Brazil, Chile, and Peru, and others will soon follow.

The cloths that will be wanted most in South America will be printed goods, bleached goods, and brown sheetings. Afterward, there will be opportunities in plenty for other lines of merchandise, but the preliminary inquiries already reported from New York give assurance that American cloths of the qualities indicated will find a ready market once the channels of trade are open again. This, in substance, is the reasoning that prevails among New England manufacturers, and it is particularly noteworthy because four of the largest manufacturers of those lines have already taken steps to make permanent connections with South American markets and others are preparing to follow their example.

The finishing companies for the moment have more orders in hand than they can take care of. This is due to the rapid shipping of goods in to be finished so that users may get whatever advantages lie in having goods at the works while dyestuffs and finishing materials last. The price advances have checked future arrangements only, but all converters who can get gray goods for spot shipment are sending them in to be dyed, printed, or finished. Two of the largest job printers have more business in hand than they can complete in the next four months. On the other hand, staple printers, like the Algonquin, American, and Pacific, have been selling stock goods only and have been curtailing their output in every direction unless goods are on order. Staple prints were placed at value during the month (Aug. 20). and this was done with the idea that a new price would not be made on any lower basis until it is very certain that a low cotton and cloth market is to prevail for a long time.

Ginghams for late delivery are being sold subject to mill acceptance, and this rule has also been applied to nearly all colored goods, principally dress ginghams, shirtings, duck, denim, ticking, and heavy colored specialties for dress goods purposes.

While there is still a very drastic curtailment of production going on in various centres in the territory, this is offset by many signs of increasing activity. All the new lace mills are as busy as they can be. Four of the largest fine goods plants have booked all the orders they can take care of on plain goods up to the end of this year and at satisfactory prices. While many print cloth mills at Fall River are curtailing, a fine goods mill like the Charlton is running at night to keep up with orders, principally for plain voiles, lawns, and fine organdies. Some New Bedford mills that had 600 out of 1,500 looms idle a month ago now have all the looms in operation for which they can find operatives. One mill at Adams, Mass., engaged on fine goods, is running more nearly full than at any time in three years.

There has been no decline in the price of standard branded bleached cottons. Nor has there been any change downward in any of the gingham lines except in the case of Bates, where an added discount was given to offset the changed form of selling from guaranteed prices to open and unprotected prices. Tickings, denims, colored duck, and fancy working suit materials are held as firmly as they were a month ago and buyers will pay the price when they need goods. as they seem to be needing them in small lots, every week.

There has, of course, been a very drastic curtailment of production among the machinery builders. Financial conditions preclude the likelihood of new investments now, and naturally, wherever enterprises are under way they have been affected adversely. Looking to the long future, and assuming that war damage will be much greater than is commonly supposed, some machinery men are conserving their resources now in the belief that a very great demand for additional machinery will come before the new year is very old. The country is certainly better contained as to machinery building than it has been as to dyestuff materials.

It is somewhat an anomalous position that cotton manufacturers are taking in the matter of cotton prices. They do not want to see cotton values go too low. They reason that if the South suffers to the extent of shutting off the purchasing power there it will react on the whole country, and at the same time will benefit other nations that may be able to take cotton and ship it in the manufactured state at a great profit to others than Americans. That 8½ to 9

cent cotton will surely permit mills to meet many of the prices that are likely to be found more or less fixed in foreign cloth markets is contended by the men who have maintained some part of the cotton goods export trade in foreign countries up to the present time. But they reason that a lower price will cripple the South, and give Japanese and English mills unusual opportunities to the disadvantage of general export trade here.

That the export trade ahead is the main theme of manufacturers in this section now, is warranted by the preliminary inquiries already received. If Kahki manufacturers could guarantee deliveries at this moment, they could sell through London several million yards of goods wanted by various foreign concerns for war purposes. Two houses that have retained South American connections have received inquiries for much larger quantities of goods than they were ever prepared to sell there and the only hitch at the moment is the mechanical one of arranging credits. Shipments can be made in time to meet customers' requirements. An increased Canadian trade is already assured to New England mills. It is also the fact that wherever credits have permitted sales in Mexico in the past month, the business tendered has been larger than at any time.

Selling agents of mills report that many West Indian and South American buyers were in the markets at the end of the month and were striving to arrange for credits so that permanent shipments could be assured. It is on the export hope that New England confidence in the future rests.

COTTON COMMENT.

BY H. AND B. BEER, NEW ORLEANS.

Owing to the chaotic conditions in Europe due to a general war in that part of the world, international credit has been suspended for the time being. There is no market for sales of foreign exchange, and, as a result, exports of cotton are almost impossible for the present.

Under the circumstances all the leading Stock and Cotton Exchanges of the world have been closed the past three weeks, and there is no indication of business being resumed in the near future.

In consequence there is no open market for cotton, all the southern spot markets remaining closed until further notice. However, there have been some sales of spot cotton of late in Liverpool on the basis of 6.20d for middling American, and some sales have been made in New York at 11 cents for middling, but these quotations are nominal. Augusta, Ga., has been the only southern spot market to report quotations, theirs for August 22nd being 9⅝ for old middling and 9½ for new middling, but no sales were reported.

The South, therefore, is in an unfortunate predicament, now that it is about to harvest a new crop of cotton. There is no cotton moving to the ports, except in a very small way, due to the lack of a foreign demand and the low prices offered for the staple in the interior compared to the cost of production.

In view of the existing unfavorable situation in the South, there is need of general cooperation on the part of southern interests. The merchant and the banker must help the farmer in a financial way in order to permit the planter to withhold his cotton from the market and thereby make it unnecessary for the South to sell its cotton at a sacrifice. In this connection State and Federal governments can do much to help the South by giving financial aid and encouragement to build warehouses in which to store the cotton until the war is over.

After the Franco-Prussian war of 1870 and the Russo-Japanese war of 1904, the price of cotton almost doubled in value.

THE KNIT GOODS MARKET.

The knit goods market in both underwear and hosiery show better prospects ahead than for some time past. The only cloud on the horizon of any importance is the shortage of dyestuffs which most of the hosiery people need regularly. Steps are being taken to correct this difficulty if possible. The effects of the war in the early part of the month was not discernible and both hosiery and underwear developed some good orders for spring delivery. It was, of course, recognized that the unsettled conditions in the cotton market and the sharp decline in prices would be made use of as an argument by some buyers. There was a feeling of considerable confidence that in both the fall and spring underwear business there would be no outside features to complicate the outlook. Charles Vezin, of Hinchman, Vezin & Co., expressed it as his opinion that we would "shortly see a merchandise 'bear panic,' because of the fear of an unprecedented shortage in hosiery. Germany is the great hosiery market for all the world and there is no other source of supply except England, France, Japan and the United States. The production of the first three is barely sufficient for the home consumption." In his opinion the wise jobber will take in his domestic goods as rapidly as he can get them, as the manufacturers, with the best intentions in the world, may not be able to take care of his wants.

The middle of the month found the underwear situation somewhat better than hosiery in some respects. However, distributors seemed to be unusually slow in placing orders. The general opinion seems to be, however, that there will be a tremendous demand for goods. There are good prospects for a bumper crop of cerials and the farmers will be good prospects. Transportation must be established to South America and with the supply of knit goods from Europe and that region cut off, American knitters, hosiery and underwear, must necessarily profit.

As the month closes, hosiery manufacturers generally are complaining about the slow business, inasmuch as orders are not coming in for a large volume of goods. However this is a dull season in all lines of textiles and hosiery manufacturers should not expect to receive better business at such times as are these, than would be the case under ordinary conditions. The view of the underwear trade is more hopeful. Agents for leading lines are inclined to view conditions in their business more optimistically than at any time since the war started. Several of them have stated that the prospects in some important sections of the country. such as the middle west, the far west and the northwest look favorable at this time. It is reported that in the opinion of the middle west jobber, the feeling in that market is that by the middle of September or the first of October a more definite line on the situation will be obtainable. The important factors that are now indicated if not fully developed will then be more or less decided. General opinion seems to be that a

number of jobbers are operating on short supplies, their expectation being that some portion of the business with retailers, when the time for shipment of goods arrives, will be held up by courteous consideration. Reports of price changes are not heard of in connection with men's ribbed goods or staple balbrigans for next season. These lines on all sides are being firmly held at the opening prices. There is little doubt but that general business conditions in all lines will improve as soon as the credit situation is straightened out, and it is known definitely just what cotton, the staple, is going to do.

THE YARN MARKET.

The yarn market for the past month has been to a great extent demoralized. This began with the panic on the cotton exchange. Some of the dealers cut prices ½ cent to 1 cent, and succeeded in selling some yarn. Sales of 20's two-ply warps were made for 21 cents; 20's single warps sold for 21 cents; 12's single sold for 19 cents and 24's two ply skeins for 22 cents. Much time was devoted to discussing the war situation and buyers held aloof from making many purchases as they expected to see cotton sell on a 9 to 10 cent basis and they desired to buy yarns on the same basis. This plan, however, was not favored by the spinners. According to commission houses in New York cotton yarn spinners in the South refused to meet the prices quoted in the New York market. The quotations did not give the correct idea of actual conditions. Weavers and knitters were reported to be carrying practically nothing in the way of yarn stocks, and it is well known they have been sticking to the hand-to-mouth method of purchasing for several months past.

The middle of the month found the carded knitting yarn situation considerably mixed. A good many reputations as competent forecasters of conditions have been shattered, and quite a number of knitters who paid 25 and 25½ cents for 24's cones and 26 cents for 26's are not consoled by the fact that the war has caused the fall in cotton prices. 16's frame spun cones in a lot of 50,000 pounds were quoted at 22, 21½, 21 and 20½ cents by four different southern spinners during this period. Another spinner quoted 20½ cents on 12's cones. Quotations on 24's southern frame spun cones remained from 23 to 24½ cents. One northern mill was reported to have 400,000 pounds of carded knitting yarn in stock and some other mills have smaller quantities. These mills were not in as strong a position as were most of the southern mills and thus northern frame spun carded 14's cones were sold for 20 cents. 16's sold for 20½ cents. A little later both 14's and 16's were sold for 19½ cents. This price cutting uncovered some soft spots in the South and quotations were shaded off somewhat. The buying was not general at the shaded prices as most knitters were confident that cotton would sell for less than 8 cents and yarn at a corresponding price. However, in spots there were quantities of 50,000 to 300,000 pounds sold with deliveries starting in September and October.

There was not a very brisk demand for either single or two ply combed yarns, although southern frame spun combed peeler cones were offered for 23½ cents, basis of 10's for September delivery. The weaving lines were quiet during this period. Lower prices have been predicted for weaving yarns, and distributors are not buying goods as a consequence.

As the month closes the cotton situation is one of the main factors dominating yarn prices, although the numerous plans for financing a portion of the cotton crop, seems to indicate that with a partial resumption of business in Great Britain, it will relieve the cotton situation and hold prices somewhere normal. Sales of 24's southern frame spun cones are being made at 21½, 21 and 20½ cents and some are being quoted as low as 20 cents. There were a few sales of 50,000 to 100,000 pounds of single combed yarns on cones being made, but it is rumored that the sales were made by quoting a price somewhat lower than the average. One sale for 50,000 pounds of southern frame spun combed peeler cones for fall delivery was made on the basis of 23½ cents for 10's. There is some improvement showing in the weaving line, but weavers are not indicating a great desire to purchase for future deliveries. It is largely a guess with everyone and the man who makes the best guess will be pointed out a little later as the successful business man who could foresee results.

Following are recent quotations on the Philadelphia market:

Southern Single Skeins.

August 23.

4s to 8s	16 @17	20s	19 @19 ½
10s	16 ½ @17 ½	24s	20 ½ @21
12s	17 ½ @18	26s	21 @21 ½
14s	18 @18 ½	30s	23
16s	18 ½ @19		

Southern Two-Ply Skeins.

8s	16 ½ @17	24s	20 ½ @21
10s	17 @17 ½	26s	21 @21 ½
14s	18 @18 ½	40s	27 @27 ½
16s	18 ½ @19	50s	33 @34
20s	19 @19 ½	60s	42 @43
12s	17 ½ @18	30s	22 ½ @23

Carpet and Upholstery Yarns in Skeins.

9-4 slack	17 ½ @18	8-4 slack	17 ½
8-3-4 hard twist	16 ½ @17		

Southern Single Warps.

8s	17	24s	20 ½ @21
10s	17 ½ @18	26s	21 @21 ½
12s	18	30s	22 ½ @23
14s	18 @18 ½	40s	28
16s	18 ½	50s	34 @34 ½
20s	19 @19 ½		

Southern Two-Ply Warps.

8s	17 @17 ½	24s	21
10s	17 ½ @18	26s	21 ½
12s	18 @18 ½	30s	23
14s	18 ½	40s	27 ½
16s	18 ½ @19	50s	33
20s	19 @20		

Northern Two-Ply Carded Peeler Skeins.

22s	21	36s	25 @25 ½
24s	21 ½ @22	40s	27 ½ @28
26s	22 @22 ½	50s	34
30s	23 @23 ½	60s	44

Two-Ply Combed Peeler Skeins.

20s	27	50s	41 @44
24s	28 @28 ½	60s	47 @50
30s	31 @31 ½	70s	56 @60
40s	36 @39	80s	66 @70

Southern Frame Spun Yarn on Cones.

8s	17 @17 ½	20s	20
10s	17 ½ @18	22s	20 ½
18s	18 @18 ½	24s	20 ½ @21
14s	12 ½ @19	26s	21 @21 ½
16s	19 @19 ½	30s	22 ½ @23
18s	19 ½		

Northern Mule Spun Carded Yarn on Cones.

4s to 8s	18 @18 ½	20s	21 ½
10s	19 @19 ½	22s	22
12s	19 ½ @20	24s	22 ½
14s	20 @20 ½	26s	23
16s	20 ½ @21	30s	24 @24 ½
18s	21 @21 ½	40s	28 @28 ½

Northern Mule Spun Combed Peeler Yarn on Cones.

10s	23 @24	22s	26 ½ @27
12s	23 ½ @24 ½	24s	27 @27 ½
14s	24 @25	26s	27 ½ @28
16s	24 ½ @25 ½	30s	29 ½ @30
18s	25 ½ @26	36s	34 @34 ½
20s	26 @26 ½	40s	37 @38

When handling a belt between two over-head pulleys, never place the ladder between the shafts nor rest it against a revolving shaft.

COTTON MANUFACTURING.

CLOTH ROOM METHODS AND MACHINES.

BY C. T. FALLIN.

We will now take up the monthly report, Fig. 9. I have seen many forms of monthly reports, some of them of great value to the mill and some that appeared to me absolutely worthless. I have never seen this exact form presented here, but have seen something somewhat similar. I consider this the most perfect kind of a report I have ever seen. It is, of course, susceptible to changes to suit local mill conditions, and may, no doubt, be improved upon.

In this report we write in the first column the style of goods to be covered, and then in the next the pattern, if any. We next have a double column headed "Received from Weave Room." In these two columns we enter the total yards and pounds, as shown at the bottom of this respective style on the receiving record, Fig. 8. We next go to the bale record, Fig. 4, and for this particular style we enter under the heading "Baled This Month," in Fig. 9, the total yards and pounds shown by adding the record.

The next column is headed left on hand unbaled at the end of the month, and to get the figures for it we have to take an accurate inventory of all goods left in the room after all goods possible have been baled at the end of the production period (which we are assuming in this case to be one month), and we must keep each style separate. This taking of an inventory at the end of the month seems at first sight to be a pretty big job, but in a well-ordered room it can be done in a remarkably short time, and, if for no other reason, it is a necessity and well worth while, for at this monthly stock-taking all the odd grades, remnants, etc., must be handled, and experience has taught me that where there are so many fingers in the pie during the month, our cloth racks or tables will have become considerably mussed up. Somebody will usually have put goods in the wrong rack or stack, and both styles and patterns will be more or less mixed; besides, they will have become "topsy-turvy," covered with dust, and need a thorough rearranging and straightening up generally. This can be done as we take the goods from the stacks or racks, weigh them and replace them. The poundage, as shown by this weighing, is then placed opposite its respective style number in the column headed left on hand unbaled at end of month. The yards in this double column is left vacant for the present and will be referred to later. We will now proceed to "Sundries," which is a general term to cover any goods sold from the cloth room, clean white rags sent to the waste house, goods delivered to the mill for cleaning, etc.

It would possibly be better to have a separate column for each item it is desired to cover.

Both yards and pounds may be adjusted by either dividing or multiplying the figures obtainable by the actual average weight shown in the extreme right column. To illustrate, suppose you have sold 100 yards of a style the actual average weight of which is 4.00; then you have $100 \div 4.00 = 25$; 100 would, therefore, be the yards and 25 the pounds; or, to reverse the operation, suppose we have sent out 25 pounds of this same goods to the mill for cleaning; therefore we would have $25 \times 4 = 100$, and 25 is the figure for the pounds column and 100 for the yards column.

Now add the amounts in these columns—viz., "baled this month," "left on hand unbaled at end of month," and "sundries"—and we then have the "available" goods brought into the month, but this is not the real production for which we are seeking, for we had something on hand at the first of the month, so we must subtract this amount.

In order to make this perfectly clear, I have inserted the arithmetical signs (+), (—) and (=) between the headings on Fig. 9, which at once makes it evident how the operation is carried out. These signs would, of course, be omitted in the actual blank. Allow me to say right here that hardly any two mills use the same method for obtaining production figures. I expect the majority use the fig-

CLOTH ROOM MONTHLY REPORT.

Blank Cotton Manufacturing Company.

For Month Ending_____19____

STYLE NO	PAT.	RECEIVED FROM WEAVE ROOM		BALED THIS MONTH		+	LEFT ON HAND UNBALED AT END OF MONTH.		SUNDRIES		=	AVAILABLE		−	ON HAND 1ST OF MONTH		=	REAL PRODUCTION		YDS. 2ND CLASS	% 2ND	STAND'D AVE. WGT.	ACTUAL AVE. WGT
		YARDS	POUNDS	YDS.	LBS.		YARDS	POUNDS	YDS.	LBS.		YDS	LBS.		YDS.	LBS.		YDS	LBS.				
TOTALS																							

_____ Overseer.

FIG. 9. CLOTH ROOM MONTHLY REPORT.

ures obtained from weighing the goods into the cloth room from the weave room, but, to my mind, this latter method is wrong. Not one man in a thousand will weigh the goods accurately, and then the weave room often makes mistakes which this man fails to catch, and these errors come up afterward for correction, every one of which makes the record just that much more inaccurate.

Another objection is that it offers the superintendent and overseers too much chance for dishonesty. I know that the majority of men are perfectly honest, and perhaps more men are honest in the cotton mill industry than anywhere else, but I believe that, so far as possible, all temptation should be removed. In other words, it is not so difficult to find an honest man as it is to keep him honest. Now, when the production is away down, it is a great temptation for an ambitious man to boost it a bit by juggling a few figures when he knows he is perfectly secure from detection.

Some mills use the goods baled as a basis, and this I consider a great improvement over the previous method, but it is inaccurate; and when we figure labor cost, etc., from such figures we are unjustly unfair against one month in favor of another month, especially if the style of goods upon which we are figuring is only a small one; for the differences in loose stock unbaled on hand at the first of the month and at the last of the month (and they are never the same) will make a difference that will throw us off several points; and if our style of goods is, say, 5,000 yards baled, and the difference in loose stock is say, 1,000 yards, it is often more than we can see how our cost calculations, per cent of seconds calculations, and per cent of possible production are thrown off, although 100 is 20 per cent of 5,000.

The calculations shown in this report as actual production will be just as near perfection as can be devised, and it certainly cannot be juggled. This method has still other features. It makes no difference which way we figure our production, we have all three figures, "Received," "Baled" and "Actual," before our eyes, and we can see at a glance how much they vary. This form of report has another valuable feature, for by figuring back a bit we can see just how much of each style of goods we should have on hand, and by comparing these figures with the actual goods on hand we can see just about how many errors have been made during the month. For instance, we will figure back on an example, taking pounds only. We have 25 pounds on hand on the first of the month, and we baled 25,000 pounds and had 100 pounds of sundries. These added make 25,125 pounds; we have received from the weave room 22,625 pounds; 25,125 — 22,625 = 2,500 pounds, or what we should have on hand. If there is more or less, we have an error somewhere and may look for kicks about mispacked goods.

Investigate the carefulness of the man who weighs in the goods from the weave room and the man who checks the bales for the press. This may help. In checking this report back in this way, a certain allowance will have to be made for natural inaccuracies, for a certain number are natural. Many of these figures are commercially calculated, and the average weights will vary from one month to another, but in a general way this figuring back will prove the accuracy of our month's work and should be practiced with the figures in the total column if with no others.

The last four columns in Fig. 9 need little comment. The one marked yards of second-class covers those for this particular style gathered from whatever source from which our seconds are figured. The actual baled yardage is my preference, as previously outlined. The percentage of seconds is the amount of production into yards of seconds figured. The standard and actual average weights were taken up fully in connection with Fig. 7 in the April number of COTTON. In a later chapter we will take up the imperfection report.

DESIGNING FOR FANCY COTTON FABRICS.

BY THOMAS WOODHOUSE AND JAMES IRELAND.

PART FOURTEEN.

Although a great diversity of effect may be obtained by the use of different ordinary flat weaves, by different colors, and by a combination of the two, as well as by the employment of yarns which vary in thickness, there are several other devices the use of each one of which enables one to obtain elegant and unique results. One very successful device is that of constructing a design by threads whose interlacing power varies considerably, or, in other words, to arrange the threads so that a certain number during the weaving process do far more bending than the others. The characteristic corded effect in Bedford cords is due to the varied method of interlacing.

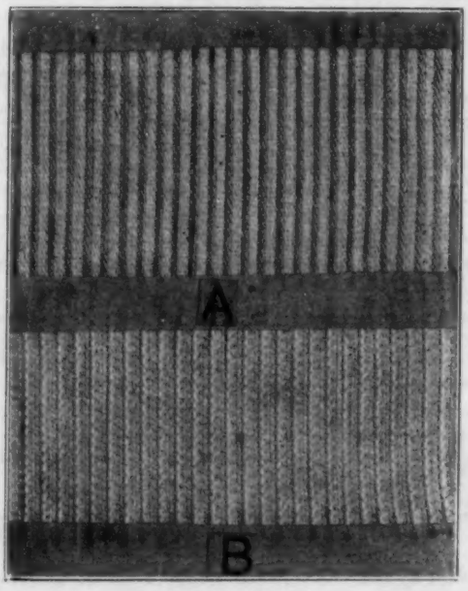


Fig. 58.

The face and back of such a cloth are illustrated at A and B in Fig. 58, while the design, draft and weaving plan on 8 harnesses are illustrated, respectively, at C, D and E in Fig. 59. The design is complete on 22 threads and 4 picks, but two repeats in the way of the weft are given in order to show up the structure more clearly. One unit of the design produces two cords or ribs in the cloth; hence in this particular example 11 threads are required for each cord; 2 of these 11 are plain, while the middle one, shown in solid black, is a stuffing thread. Each pair of plain threads forms a groove or recess; the stuffing thread, as its name implies, never appears on the surface, but lies between those picks which are weaving plain on the face and the floating picks on the back.

It will be seen that each pair of picks appear alternately on the face and on the back. Thus the second and third picks as well as the sixth and seventh picks are under the first rib formed by the first half of the design, but in the second half of the design they interweave plain with 8 threads, 4 on each side of the stuffing thread. On the other hand, picks 1, 4, 5 and 8 appear on the surface in the first rib, but go to the back in the second rib. The cross and dot in the design indicate where the warp and weft are weaving plain, while the crosses represent the threads lifted to allow the picks to go to the back of the cloth. The cloth

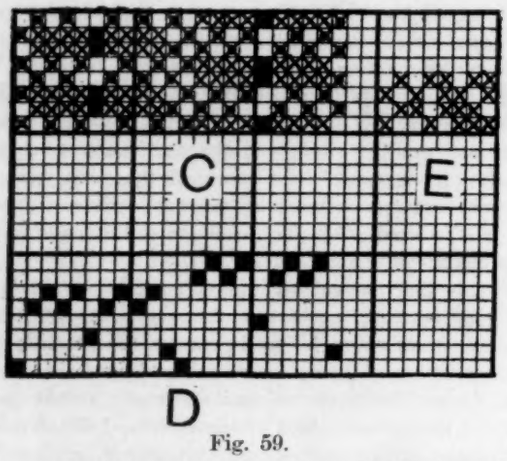


Fig. 59.

under consideration has 110 threads per inch, 10 of which are stuffing threads, and 72 picks per inch. The sole function of the stuffing thread is to give prominence to the rib or cord, and hence this prominence may be increased or decreased at will. When no stuffing thread is used, two harnesses, the third and fourth in the weaving plan, may be left out, but one, two or more stuffing threads in each cord may naturally be operated without increasing the number of harnesses shown.

Where stuffing threads are used it is advisable, if not essential, that they be placed on a separate warp beam, since these threads form a practically straight line in the center of the cord. It is also sometimes advisable, if a prominent cord be required, to place those threads which form the cord on a separate beam to those plain threads which form the hollow between the cords. A reasonably proportioned cord can be made, however, with the two latter sets of threads on the same beam, for it will be observed that the number of interlacing points of the plain threads is twice that of the cord threads, and hence the latter stand out on the surface of the cloth.

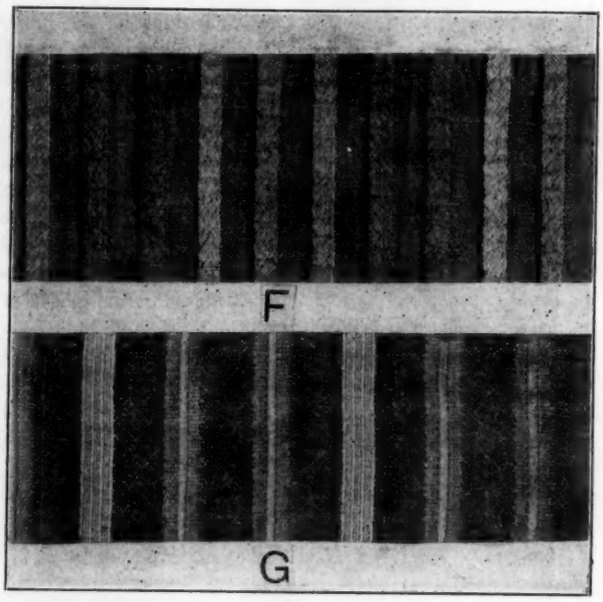


Fig. 60.

weave for cloth F is absolutely plain, and the warp threads are arranged as follows:

Pale Green	8	16	16	16	16	8	= 80
Black	2	2	2	2	2		= 10
Pale Blue	12						= 12
Cream		12					= 12
Slate			12				= 12
White				12			= 12
Pink					12		= 12
					Threads per repeat		150

The warp for this cloth would require to be placed on two warp beams, the green and black threads which form the flat weave effect on one beam, and the remainder, which form the crepon stripes in various colors, on the other beam. The use of two separate warp beams is not due to any difference in the interlacing of the two sets of threads, because, as mentioned, all the threads weave plain, but is essential because those threads which form the crepon stripes are required to come off the beam more rapidly than the green and black threads. The beam containing the pale

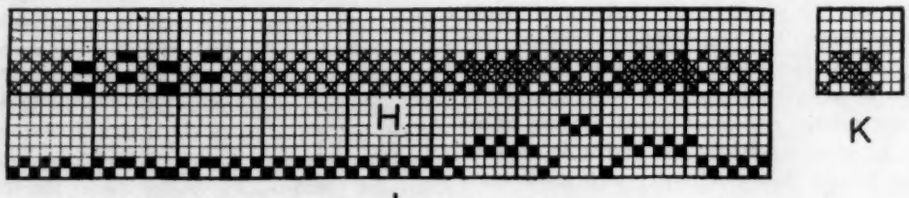


Fig. 61.

Somewhat similar prominent features obtain in the cloths marked F and G in Fig. 60, the former being due to stripes of plain alternating with stripes of a crinkled or crepon effect, whereas the effects in pattern G are due to a combination of plain, rib, crepon and Bedford cord. The green and black threads would be tensioned or paced similarly to a beam for ordinary plain cloth, whereas the beam which carries the threads for the crepon stripes would be lightly paced in order that the threads may be drawn forward in larger quantities every pick, and thus cause the

puckered or crinkled effect which is the attractive and main feature of such cloths. The relative lengths of the plain and crepon warps are 21 and 27, and consideration would obviously have to be given to this fact when making up the warp calculation for the length of cloth required.

The cloth contains 78 threads per inch and 68 picks per inch of cream filling. In the production of such cloths great care has to be exercised in the pacing of the two warp beams, as otherwise the cloth will be irregular. The relative lengths in inches of the two warps should be marked occasionally—i. e., in this case 21 inches and 27 inches, respectively, from the fell of the cloth, in order to see if both marks reach the fell of the cloth at the same time.

The broadest and alternate stripes in pattern G, Fig. 60, are developed with the crepon effect, and these, in conjunction with the flat, ribbed and corded weaves, give to the pattern a pleasing effect. The warp threads are as follows:

Brown 11		22	22	11	= 66
2-Ply White Twist	1 1 1 1				= 4
Single Twist..	2 2 2	6	6		= 18
Pale Blue		9 9	9 9		= 36
	White Rib and Plain Stripe	Bedford Cord	Bedford Cord		124 per repeat

A section of the complete design is illustrated at H, Fig. 61. Threads 1 to 6, 21 to 42, and 67 to 72 represent the brown stripes. Threads 7 to 20 represent the solid white stripe in plain and rib; the solid marks representing two single threads, or one 2-ply thread, as actually obtains in this example. Threads 43 to 66 represent the three ribs of Bedford cord in blue, white and blue, and the marks in this part of the weave are similar to those in C, Fig. 59, the stuffing threads being omitted, and two widths of cord instead of one constant width.

The draft for the section illustrated at H is shown at J, and the weaving plan K shows that 6 harnesses only are required. There are 64 threads per inch, reeded in two's in the brown stripe, and 96 threads per inch, reeded in three's in the blue and white Bedford cord stripes; the 2-ply white one per split, and the remaining white two per split. The reed has, therefore, a constant number of 32 splits per inch, while the white filling contains 76 picks per inch. The relative lengths of warp in the plain and crepon portions are 33 to 48.

(To Be Continued)

The bulletins recently prepared by Commercial Agent Ralph M. Odell are more than mere statistical studies, for Mr. Odell goes back of the figures to ascertain the factors that have helped or hindered the sale of American goods. One country buys certain classes of goods because of its location and its physical conditions, the native or acquired tastes of its people, and their familiarity with goods early introduced. The United States sells to these countries if it produces what they want and sells it at prices and on terms satisfactory to the buyers. There are, of course, other factors, such as transportation facilities, customs duties and long-established business relations, and all these are analyzed, with special reference to their influence on American trade.

WINDING AND BEAMING.*

BY IBZAN SAGAR.

It is now over fifty years since tape sizing, or "slashing," of cotton threads was introduced, but from observations made at various mills throughout Lancashire during the last twenty years, the writer is convinced that on account of the great laxity in regard to the manipulation of cotton threads the best condition for manufacturing purposes has not been secured. There do exist at the present time—especially with spinners who have taken over the department of back-beam making since the introduction of ring-spun yarns—theoretical conclusions which are entirely contrary to the economical and practical methods. This results in the production of beams, the unwinding of which occasions great loss and causes disorganization in the sizing room and weaving shed; and the writer asserts that bad beaming is responsible for more of the hard work, bad material, and loss suffered by those who have to manipulate it afterwards, than any of the mistakes made in other departments of manufacturing.

Seeing that perfect beaming can not be obtained without good winding, perhaps a few comments on the preparation of the yarn before it reaches the beaming frame will not be out of place. It is acknowledged that no yarn is fit to go into work unless its strength stands the Lea pulls of the acknowledged dividend—viz., 1,800 divided by the counts giving the strength in pounds, adding 5 per cent for Egyptian cotton. If the test is lower, then it is the forerunner of trouble unless extra care is taken by a reduction of speed.

All yarns should be conditioned with water to about 8 per cent over actual dryness; the temperature to be not less than 65 degrees after it has left the spinning room. Any excess over this makes bad skewering, and a straining drag both in winding and beaming is set up. If underconditioned, the fibres are liable to break away from their foundations by the necessary drag in the winding, and friction in the beaming. It is essential that the yarn in cops should be handed to the winding department in as little disturbed a state as possible, to ensure easy working and little waste. The adjustment of the drag between cop and bobbin is an important factor, and should not by any means be neglected. Too little thought is given to this matter by the trade, and it will pay the spinner to give better attention to it.

So far the writer has not been able to find a basis for adjusting this drag proportionately to the counts which it demands, but as a basis, medium counts, say 40's, should be unwound at the rate of 12 yards, finishing at the rate of 171 yards per minute on the front spindles, and when transferred to the back spindles the speed should be the same. But it is found in various parts of Lancashire that the spindles are timed to take 120 yards per minute at the start, but finish up on the back spindles at the rate of 200 to 250 yards per minute. When, however, a thread travels beyond 170 yards, a weakening in the thread takes place proportionate to the velocity, and more so if the drag is tightened up by a wide knee-board wrapped with coarse flannel, and a close woven stiff travice brush. In the past the trade has been set going by machine-makers who cannot have given any thought to proportioning the speed of

* Abstract of a paper read before the Manchester School of Technology Textile Society.

the front to the back spindles, when only one-sixth of the speed of the back is reduced to make up for the larger circumference of the bobbin. There is still plenty of room for greater technical knowledge in this respect—for example, to ascertain when the right tension on the thread is secured, as it very often happens that too little tension is given at the beginning and too great at the finish in the filling of the bobbin. In many cases good and well-spun yarn has been divested of its strength and elasticity by a rough knee-board and too great velocity in winding.

The trade has now generally adopted backbeams 54 inches wide by 21 inch flanges as the best for production; but it has not adopted a correct size of bobbin, adjustable to the various counts to be treated. Very great laxity is observed in some of the newly erected mills, in that they try to make one large size of bobbin do for both fine and coarse yarns, only distinguishing the counts by colors. On the stretch, coarse counts go along productively, while fine counts are unproductive through the heavy bobbin overbalancing the calculated strength of the yarn. It has never been thought out that the stretch in the unwinding is twice as great at the beginning as it is at the finish, and the writer is surprised that a standard is not used for various counts. I should fix that standard of bobbin when it is full at 20,000 yards, this being not too heavy to stand momentum in operation. It should not be overlooked that a bobbin works at its best when filled with a little over the length required on the beam. I very much prefer the bobbin, which is filled barrel shape to that of the straight lift, as the former is easier to work and makes less waste.

If an ideal bobbin is adopted, there is still care to be exercised in adjusting the drag from the cop or hank to the bobbin in the winding frame, so that the yarn retains its strength for good beaming, sizing, and weaving.

A winding master is often compelled to extract spinners' faults by drag, but very often overreaches himself and gets broken thread, or the fibres are stretched out of proportion. Spinners' ordinary faults are bad enough when going through the beaming, sizing, and weaving, but not so great as those arising from a weakened thread—one with its back continuously broken by excessive speed and drag.

A reliable test of the tension on the yarn as it is wound and unwound on the bobbins, is to attach a Salter's dram spring balance to the yarn between the travice and drag board, to indicate the drag. If it registers under 4 drams the drag is too little, if over 8 drams, it is too much. If a bobbin of yarn 5 inch by 3 inch flanges, holding 21,000 yards of 40's counts, is tested in the upright v-creel of a beaming frame, where there are fixed glass steps and upright glass rods—as an ideal condition,—the drag is 3½ drams. With the same bobbin with wood steps and iron upright rods, the drag is 6 drams. With a large bobbin 5 inch lift by 4 inch by 4½ inch heads, holding 42,000 yards of 40's counts—so much in vogue,—with wood steps and rods, the drag will be equal to 11 drams; and with the same large bobbin running in glass steps and glass rods, the drag will be equal to 6 drams.

It is a known fact that drag should be reduced to a minimum in the beaming frame. The idea of extracting weak places from the yarn in the beaming frame is a mistake. Everything that is bad which escapes on the bobbin should be allowed in reason to run off on the beam, if that beam is to run off well in the sizing machine.

The adjustment of speed in the beaming frame plays an important part. If the outfit consists of large heavy bobbins with wood steps and iron guide rods, the speed should be about 65 yards per minute only. But if the bobbins are the exact size, and hold just the length to fill the beam, and are placed in the creel with glass steps and glass guide rods, the machine may be run 75 to 80 yards per minute, with fewer breakages in the yarn.

The writer strongly condemns the system in vogue at some places where they creel with large full bobbins in some parts of the creel, while other bobbins are three parts full, or only half or even a quarter full. The difference in the tension on each thread is great, and it follows that the unwinding of the threads varies accordingly, and causes annoyance and loss to the weaver.

The measuring and carrying rollers, along with the front and back expansion combs, should be made as smooth as possible, and well balanced, and great care should be exercised to prevent them getting rusted.

Most of the spinners now have the modern conditioning watering trough, fixed before the expansion comb, with automatic feed, and compositions in the water which are only known to those in charge. These watering troughs, with the flannel rollers revolving in the water, are not always set with a spirit level. Consequently, the roller revolves deeper in the water at one side than at the other, which lays on a greater percentage of water. It follows to reason that the yarn at the deeper end will wind tighter on the beam than the less-conditioned end, and the yarn will feel spongier and gradually increase in circumference, so that when the beam is full it is from 1 to 2 inches greater in circumference at that end than at the other. There are today spinning managers following these beams to the manufacturer to be shown ends coming off slack at one side and tight at the other; and when this condition of things turns up it is almost impossible for the sizer and weaver to do justice to their work.

This modern addition to the beaming frame has caused the machine makers to lengthen the beam arms to leave room for the watering trough between the beam flanges and expansion comb, with the result that the beam barrel is compelled to work on the falling sides of the drum, in place of fixing it on the top to enable the beam, by its own weight, to grip the drum. Consequently, the beamer is compelled to place heavy weights on the ends of the beam arms to get the grip to start the beam. A beamer is not always thoughtful to find equal size weights, and oftentimes one weight is several pounds heavier than the other, and even where there is no conditioning, these weights set up unequal pressure, so that the side with the light weight will come off slack.

The use of cast and malleable beam flanges should be discontinued, as, unless these are kept straight and painted, much trouble is caused for the sizer and weaver. The enamelled and light steel flanges without holes are the best, as they give a better balance in the unwinding. Also, the beam barrel should be not less than 8 inches in diameter, in place of the 4½ inch, now standardized, provided the barrel can be constructed so as to weigh not more than 70 pounds, including the 21 inch flanges. All beams should be made as true as if they had been turned up on a lathe, but unfortunately the trade has adopted the wood barrel, which nowadays is made from common and unseasoned timber, and when the beam is returned from the manu-

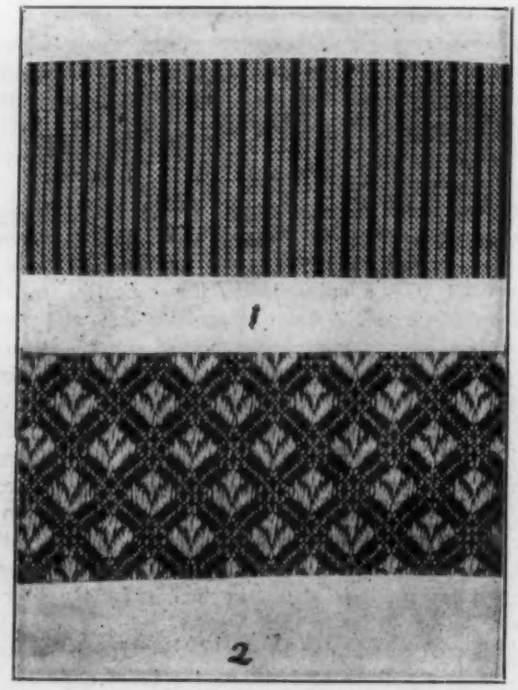
facturer to the spinner it is thrown about and left exposed to wet weather, and afterwards stored in a dry room or in the hot sun, and in consequence the barrel becomes twisted out of truth.

TWO COTTON FABRIC DESIGNS.

BY J. W. K.

Neat and attractive design for cotton fabrics being sometimes appreciated by the trade, I submit the following from actual practice:

Fig. 1 is a plain neat and effective style for cotton costumes, nurses' uniforms, and children's suitings. The pat-



terns should be small, such as the one given, and the colors most desired are black, dark green, navy, brown, dark red and blue. The filling must be of the same color as that used in the warp. The warping pattern follows:

Six threads white.
Two threads black.
Six threads white.
Six threads black.
Twenty threads per pattern.

The particulars for manufacture are, 36 dents per inch in the reed; 4 threads in one dent, 40's Egyptian warp; 32's American cotton ring spun for the filling; 60 picks per inch of filling.

The threads must be drawn in the harness two threads in each eye, and the weave is plain. The usual width for this cloth of this character is 31 inches in the reed space for a 29 inch cloth; 68 yards of warp for 64 yards of cloth.

Ends per inch in reed = 144 × 31 inches reed space = 4,464 threads in the warp, consisting of 221 repeats at 20 threads per pattern + 44 threads for selvedge. The warp will be divided into 2,652 threads white and 1,768 threads black.

The cheapest method of manufacture would be to order two warps of 1,326 threads each for white, and one warp of 1,768 threads for black, and have them dressed on the beam. The calculations for the yards per pound are as follows:

Warp = 4,464 threads × 68 yards long ÷ 840 yards per hank × 40's counts = 9 pounds of warp yarn.

Weft = 60 picks per inch × 32 reed space × 64 yards of cloth ÷ 800 yards per hank × 32's filling = 4 4/5 pounds of filling.

Total weight of yarn in 64 yards cloth = 13 4/5 pounds.

It will be noticed that no allowance has been made for waste in the warp. This will not be necessary as the yarn should be delivered calculation length (840 yards per hank) from the grey warper. The yards of cloth per pound will be as follows:

Pounds of cloth = 13.80 ÷ yards of cloth, which is 64 = 4.63 yards of cloth per pound, or 4.63 yard goods.

Fig. 2 is a mercerized cloth which can be woven by a dobby and is useful for ladies' dress goods, coverings, bed hangings, and curtains. In plain white, cream, and light shades it is very effective. This cloth has been woven with

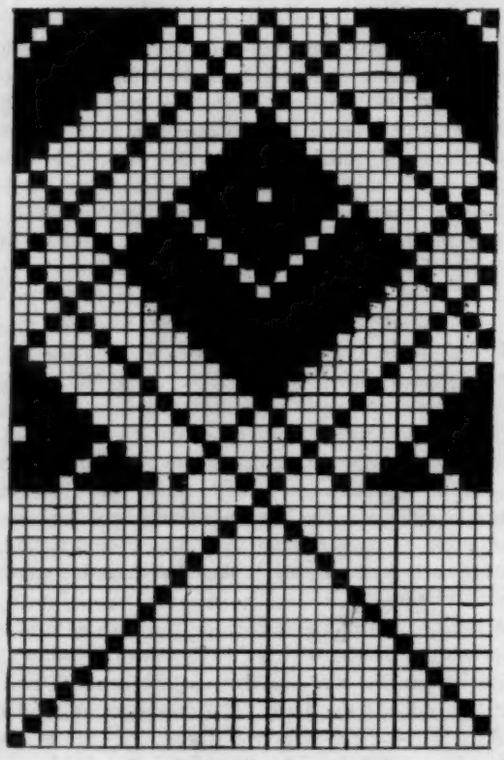


FIG. 3.

a light blue warp and navy filling. A large variety of colorings can be produced by having a pattern warp made of various colors and using filling of various colors, thus there will be plain patterns and colorings of various blends.

Fig. 3 gives the whole design for this cloth. The draft for the heddles is given under it, 16 being required. For the dobby design the sixteen squares and thirty picks on the left of the design may be used.

The particulars for manufacture are: 36 dents per inch in the reed, 2 threads in 1 dent, 2/40's mercerized warp, and 64 picks of 2/40's mercerized for the filling.

This cloth is generally made 26 inches wide, and 28 inches in the reed space, 60 yarns of warp to 56 yards cloth. Ends per inch in reed = 72 × 28 inches reed space = 2,016 threads in the warp. The calculation for yarns per

pound is as follows, and dressing to save waste is recommended:

Warp = 2,016 threads × 60 yards of warp ÷ 840 yards per hank × (2/40's = 20's) counts = 7⅕ pounds of warp yarn.

Weft = 64 picks per inch × 28 reed space × 56 yards of cloth ÷ 800 yards per hank × 2/40's = 20's filling = 6.27 pounds of filling. The yards of cloth per pound will be 13.47 ÷ 56 = 4.15 yards per pound.

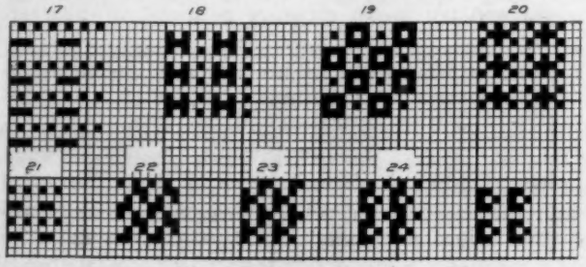
KNITTING DEPARTMENT.

DESIGNING ON THE CIRCULAR FRAME.

BY WILLIAM DAVIS, M. A.

COMBINATIONS OF PRESSERS.

Given in stock a few pressers such as those described, a wide diversity of new patterns can be obtained by combining them in various ways and on frames with different feed numbers. An examination of designs 17 and 18 will show them to be a combination of 1 and 1 with 3 and 3 pressers.



For design 17 we require a 4-feed machine arranged as follows:

First feed, 3 and 3 presser.
Second feed, plain presser.
Third feed, 1 and 1 presser.
Fourth feed, plain presser.

For design 18 a 4-feed frame is also required, and the arrangement is as follows:

First feed, 1 and 1 presser.
Second feed, 3 and 3 presser.
Third feed, 1 and 1 presser.
Fourth feed, plain.

The resultant design shows a small size of the letter H, and this genre of ornamentation is frequently employed for figuring cycling and athletic hose tops.

Design 19 is even more pronounced in character and is adapted for the 6-feed machine, arranged as follows:

First feed .....3 and 3, pressing 4, 5, 6, etc.
Second feed .....1 and 1, pressing 2, 4, 6, etc.
Third feed .....3 and 3, pressing 4, 5, 6, etc.
Fourth feed .....3 and 3, pressing 1, 2, 3, etc.
Fifth feed .....1 and 1, pressing 1, 3, 5, etc.
Sixth feed .....3 and 3, pressing 1, 2, 3, etc.

Design 20 is a very popular pattern, made with 1 and 1 combined with a 3 and 3 presser on the 4-feed frame:

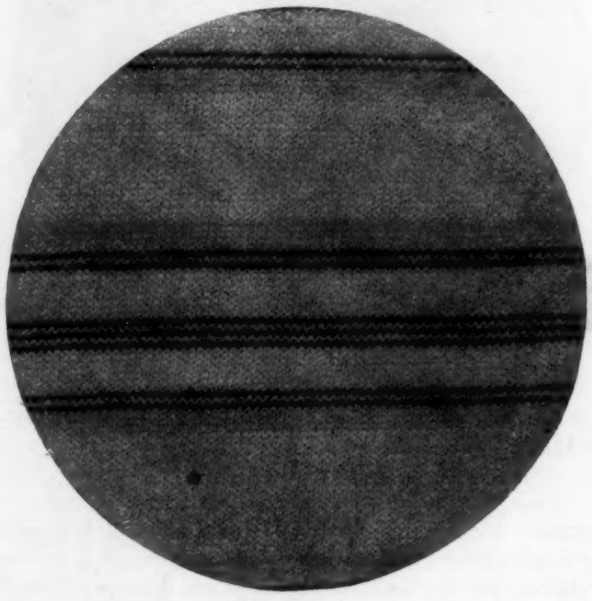
First feed, 1 and 1 presser.
Second feed, 3 and 3 presser.
Third feed, 1 and 1 presser.
Fourth feed, plain presser.

Designs 21 to 25 give examples of combinations of the 1 and 1 with 2 and 2 pressers, with particulars as follows:

Design 21, 4-feed frame:
First feed, 2 and 2 presser.
Second feed, plain presser.
Third feed, 1 and 1 presser.
Fourth feed, plain presser.

Design 22, 4-feed frame:

First feed.....2 and 2 presser, pressing needles 3, 4, 7, 8, etc.
Second feed...1 and 1 presser, pressing needles 1, 3, 5, etc.
Third feed....2 and 2 presser, pressing needles 1, 2, 5, 6, etc.
Fourth feed...1 and 1 presser, pressing needles 2, 4, 6, etc.



PATTERN A.

Design 23, 4-feed frame:

First feed .....1 and 1 presser, pressing 2, 4, 6, etc.
Second feed .....2 and 2 presser, pressing 3, 4, 7, 8, etc.
Third feed .....1 and 1 presser, pressing 2, 4, 6, etc.
Fourth feed .....2 and 2 presser, pressing 1, 2, 5, 6, etc.

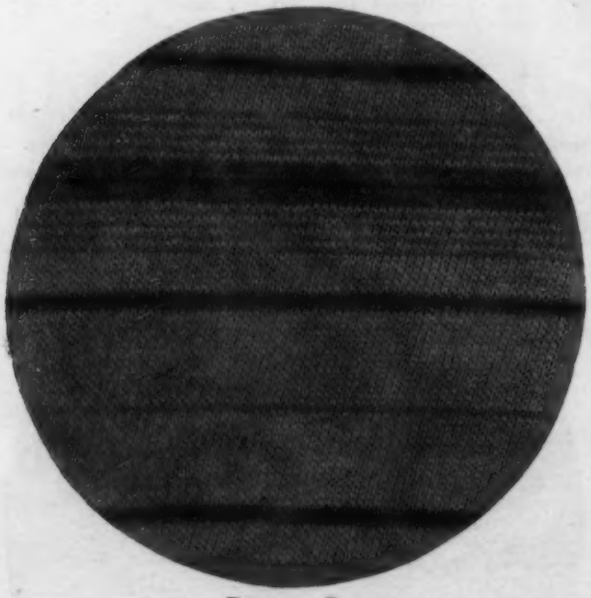
Design 24, 4-feed frame:

First feed.....2 and 2 presser, pressing needles 3, 4, 7, 8, etc.
Second feed...1 and 1 presser, pressing needles 2, 4, 6, 8, etc.
Third feed....2 and 2 presser, pressing needles 3, 4, 7, 8, etc.
Fourth feed...1 and 1 presser, pressing needles 1, 3, 5, 7, etc.

Design 25 is the same as design 24, only in the fourth feed a plain presser is used in place of the 1 and 1.

In all those designs involving combinations of pressers the number of needles in the frame require to be divisible exactly by the number which is a measure of the pattern number of each wheel. Thus in combining 1 and 1 with 2 and 2, the needles in the frame would require to be divisible by 4; for the 1 and 1 with 3 and 3 combination the number would need to be divisible by 6, and so on for other combinations.

The frame under consideration has been adapted with considerable success to the production of striped goods, and has an attachment for using several colors in a fabric, those colors being introduced from a single course to any number. Some illustrations of striped goods made in this way are given herewith, and it may be of interest to append some color schemes to demonstrate how such cloths are made. The fabrics have a large use in athletic wear as sports goods, and for the summer season a good handling cotton of considerable strength is employed. Boating and bathing costumes are important sections of this trade, and for these the most general ground is white, horizontal stripes of bright colors being introduced in correct quantities and proportions so that they will preserve harmony.



PATTERN B.

The following are some color schemes found most suitable for cloths of this genre:

PATTERN A.

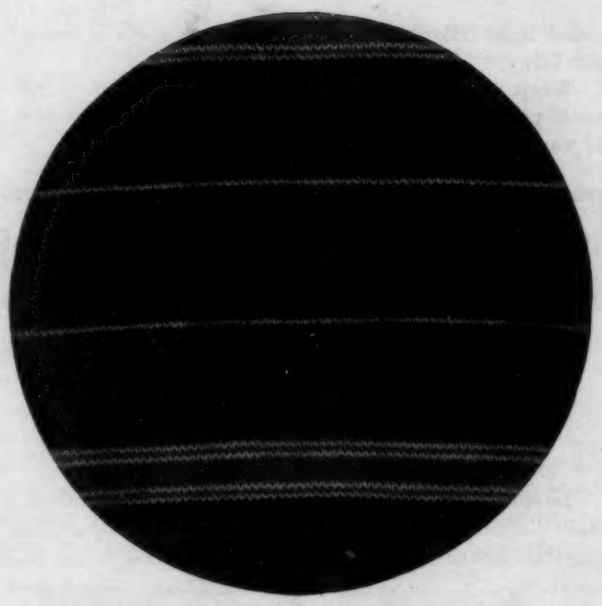
First Course—20 courses white, 4 courses lavender, 3 threads; 1 course tan brown and 1 course white, 8 courses white, 5 threads; 1 course red and 1 course white, 8 courses white, 3 threads; 1 course tan brown and 1 course white, 1 course white, 1 course white, 4 courses lavender.
3 threads; 1 course red and 1 course white, 8 courses white,

Second Course—20 courses white, 4 courses lavender, 3 threads; 1 course red and 1 course white, 8 courses white, 5 threads; 1 course tan brown and 1 course white, 8 courses white, 3 threads; 1 course red and 1 course white, 1 course white, 1 course white, 4 courses lavender.

In this pattern the broad band of lavender and the 1 and 1 effects form a very pleasing alternation. The strong colors are effectively modified by the use of the single courses of white.

Another example of the 1 and 1 effects producing smart patterns is afforded in the following scheme of Pattern B: 15 white, 1 blue, 15 white, 1 fawn, 1 red, 1 fawn, 6 white; 8 threads alternating, 1 blue and 1 white; 3 fawn, 1 red, 3 fawn; 8 threads alternating, 1 white and 1 blue; 6 white, 1 fawn, 1 red, and 1 fawn.

In each of those examples the color scheme is symmetrical. Frequently a pleasing variety is given to the effect by two colors exchanging their functions in alternate stripes, as exemplified in color scheme in Pattern A, where

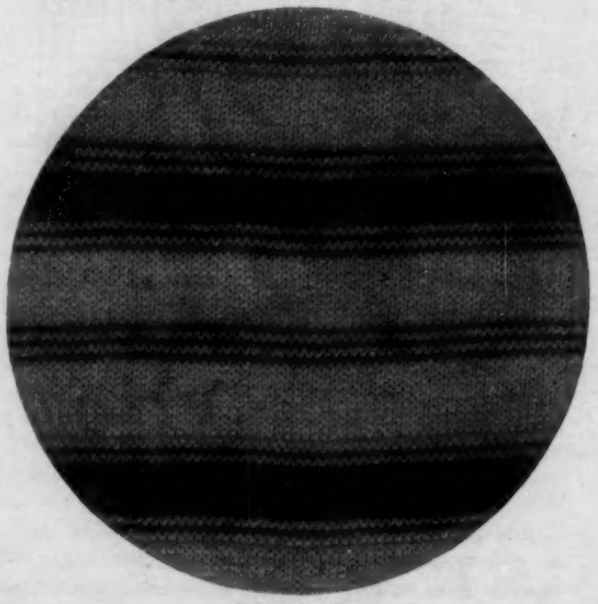


PATTERN C.

the red and tan brown exchange positions in alternate stripes.

Effects on black and dark grounds often find favor, as in the following scheme, Pattern C: 25 black, 1 white, 5 black, 1 green, 1 black, 1 green, 5 black, 1 brown, 5 black, 1 yellow, 1 white, 1 yellow, 1 white, 5 yellow, 1 white, 1 yellow, 1 white, 5 black, 1 brown, 5 black, 1 green, 1 black, 1 green, 5 black, and 1 white. This makes a very effective striped pattern of dark tone, the sombreness of which is suitably lighted up by the yellow and white bands. The 5 yellow courses are further the "center of symmetry" for this pattern, for on either side of this band the color scheme is practically the same.

The following color scheme is a very good example of how the designer, by the simple device of counterchanging the functions of the colors, may obtain a pattern which has the appearance of being produced by a much larger assortment of colors. In this example there are only three colors in addition to the ground white, but the method of inter-



PATTERN D.

changing produces in the fabric an interesting optical illusion. I am referring now to Pattern D:

White	9	1	1	10	1	1	1	1	10	1	1	10	1	1		1	1	10		1	10	1	1	1	1
Brown		1		1		8			1		1		1			1			1		1				1
Green					1		1	1		1					8			1		1		1		1	
Blue	1		1									1					1	1					8			

(To Be Continued)

Dyeing, Bleaching and Finishing.

BLEACHING TURKISH TOWELS AND KNIT GOODS.

BY WILLIAM B. NANSON, F. C. S.

Since the introduction of hypochlorites has freed the bleacher from the difficulties and tediousness of grass bleaching, further progress has been chiefly on the mechanical side, and great improvements have been made in this direction during the past decade. Cotton goods are now usually bleached in kiers and tanks by means of pressure and vacuum, or, of circulation and this line of action or procedure is especially adapted to the bleaching of Turkish towels or similar goods when the pressure of the heavy washing machine rolls or squeezers in combination with the tension caused by pulling the goods back and forth would be detrimental to the pile. It is therefore indicated that the proper procedure would be a series of kiers and vats, by means of which the goods could be steeped, boiled, washed, bleached and washed again with as little squeezing as is consistent with the actual necessities of the case.

I therefore advise the steeping, boiling and washing of the goods of this character without their removal from the kier, and by means of pressure and circulation, and their removal from the kier, when the boiling and washing is completed, by means of draw rollers, and their deposition over reels into tanks or vats where they can be chemiced and washed and otherwise finished off by further circulating devices without being run through any pressure rolls at all.

After the goods have been sewed together carefully in the grey room and all oil stains washed out as described in the earlier chapters of this article, they should be wet out in a diastafor solution at about 120 degrees F. through an ordinary liming machine, giving the goods a light pressure and running them quite wet into the kier. This diastafor solution should be made with 5 pounds of diastafor to every 100 gallons of water and should never be allowed to get hotter than 130 degrees F., or colder than 110 degrees, for it is between these two extremes that diastase, the active principle of diastafor, is the most active, and any temperature higher or lower than these makes for inefficiency, while at a temperature above 140 degrees F., or below 50 degrees F., it is entirely inactive. Furthermore, its active principle is completely destroyed at 160 degrees F. It is, therefore, indicated that when mixing a diastafor solution, the safest way is to heat the water carefully to the right temperature and then add the diastafor.

It would be also as well to remind the reader that diastafor is injured by light and must therefore be used as soon as mixed, it cannot be kept over without deterioration.

Of the numerous forms of kier in use, the injector type is the one best adapted for our purpose. This consists of a cylindrical vessel constructed of stout boiler iron, with egg shaped or bulging ends. It is from 10 to 12 feet in height and from 6 to 7 feet in diameter and stands on three legs. The bottom exit pipe inside the kier is covered with an umbrella shaped shield or false bottom to provide a drainage space for the accumulation of the liquor and to prevent the pipe from being blocked. The goods are evenly packed to within 2 or 3 feet of the manholes, then the liquor is run in until the level of the liquid reaches to within 10 to 12 inches of the top of the goods. The manholes are now closed and the steam is turned on at the injector. The effect of this is to suck the liquor through the bottom exit of the kier and force it through a pipe to the top of the kier where it dashes against an umbrella shaped distributing disc and is sprayed over the goods in the kier, through which it percolates until arriving again at the exit pipe at the bottom, when it is again sucked up and carried to the top of the kier, a continuous circulation being thus effected. As the circulation proceeds, the steam condensing in the liquor rapidly heats the latter to the boiling point, and as soon as, in the opinion of the bleacher, all air has been expelled, the vent pipe at the top of the kier is closed and the boiling is continued for periods varying from 4 to 12 hours and at from 20 to 60 pounds pressure. Steam is then turned off and by opening the valve in exit at the bottom of the kier the liquor is forced out by the steam it contains.

I prefer a kier that can be worked at a pressure of from 25 to 40 pounds of steam, for the reason that the higher the pressure the higher the temperature will be, and a high temperature softens and disintegrates the motes and seed hulls in the cotton. We must not, however, overlook the fact that high pressure kiers, working with materials which we propose to use in bleaching towels, are, in the hands of an inexperienced bleacher, a very dangerous proposition, indeed as past experience has shown, and I now have before me in my mind a long list of disastrous kier explosions, many of them accompanied with loss of life and most of which have been caused by a lack of knowledge on the part of the bleacher of a few rudimentary chemical laws, coupled with a complete ignorance of thermo-dynamics. He should know that water, when boiled under pressure, absorbs heat units sufficient to convert itself entirely into steam should the pressure be removed, and that when soda ash, soap, and cotton goods are boiled together there is an immense volume of carbonic acid gas released from the soda, which is taken up by the liquor and which remains in solution and passive in it only so long as the pressure is retained. But, should the pressure be suddenly released, this immense volume of carbonic acid gas is immediately liberated into vigorous

action, to swell the volume and force of the liberated steam with most disastrous results.

I have known bleachers, when boiling goods in a pressure kier, to suddenly reduce the pressure either by throwing open the vent pipe at the top of the kier or by turning a stream of cold water on the outer surface of the hot kier; this is a most dangerous proceeding, because it has the effect of suddenly reducing the pressure in certain parts of the kier. In the first instance by the removal of the pressure in the top or upper part of the kier, and in the second instance by condensing the steam on the inner parts of the shell and creating a vacuum whenever the cold water strikes the outer shell. In either case the sudden reduction of the pressure has the effect of instantly releasing with explosive force the latent steam and carbonic acid gas contained in the 800 gallons, or more, of the liquor in the kier, and if there is any weak spot or joint in the iron shell of the kier, a disastrous explosion is the result.

It is always dangerous to use soda ash in a kier on account of the carbonic acid gas it contains and therefore it has become recognized as the proper thing to use caustic soda in high pressure kiers, because this contains no carbonic acid. But in our case we cannot do this on Turkish towels as it would tend to destroy the feel and the effect we wish to reach, and for other reasons, which I explained in full in the early chapters of this article. Therefore I advise the use of a kier running at a pressure of from 8 to 15 pounds, though I think 25 pounds is better.

After the goods have been run through the diastafor solution into the kier, the latter should be filled up with the same solution to within a few inches of the top and the goods allowed to steep in this all night. In the morning run the liquor off and fill the kier up with cold water, start the injector and circulation until the water gets warm, or, to about 100 degrees F.; when this temperature is reached, run the liquor off and repeat the cold water and circulation a second time, being careful not to let the water get too hot or it will fix the oilstains. After doing this boil the goods in the same kier without removal for from 4 to 6 hours in the following mixture:

100 pounds Soda Ash.
60 pounds Chip Soap or Bleaching assistant.
2 quarts Turpentine.
6 quarts Ammonia.

After boiling in this for 4 to 6 hours open the bottom valve and blow the liquor off; and then without washing or removing the goods from the kier boil them all night in the following mixture:

150 pounds Soda Ash.
75 pounds Soap or Bleaching assistant.
20 pounds Aniline.
2 quarts Kerosene.
6 quarts Ammonia.

After boiling the goods 12 to 14 hours wash them well in the kier without removal, in cold and hot water.

It may be as well to say that it is of the greatest importance that the goods should be evenly packed in the kier, for if channels or loosely packed places are left, the liquor circulating through the kier when boiling is subsequently in progress will follow the line of least resistance, and the result is an uneven treatment. It must be also noted, that sufficient liquor must be used in boiling to bring it up to within 6 inches of the top of the goods before the circulation is started. The quantities given are for a 5 ton kier and it may take from 1,200 to 1,500 gallons to boil it right. Care must be also taken when the kier has finished boiling, to empty it or change the liquor, the following being about the proper procedure: First shut off the steam, then slowly and carefully open the exit pipe in the bottom of the kier and blow off the steam and liquor. As soon as the pressure is off, cold or hot water or any succeeding liquor can be run into the top of the kier so as to prevent the top of the goods from becoming dry, as they quickly will do in the hot kier if not cooled off or kept wet. Always cool off a kier from the inside.

Having now boiled the goods and washed them thoroughly in the kier, they may be drawn from the kier by means of drawrollers and delivered into the chlorinating vats by means of reels, without going through any washing machine or squeezer rolls. These chemicking vats should be rectangular and so constructed that the goods can be plaited down in them from the outside, they must have false bottoms and a centrifugal circulating pump, with a tank or large cistern to hold the chlorine mixture and a perfected distributing spout above them so that the chemicking liquid can be pumped up and circulated and distributed over the goods while they are being plaited down in the vat.

Ordinary bleaching powder as usually used in the bleach houses of today is entirely unsuitable for Turkish towels or knit goods, for the reasons given in the earlier chapters of this article and I shall, therefore, advise a treatment with Hypochlorite of Soda. This compound can be very readily made by mixing 200 pounds of bleaching powder in 100 gallons of water, and, after complete solution has taken place, adding 120 pounds of soda ash dissolved in 100 gallons of water.

After this has settled add about 10 pounds of carbonate or sal soda dissolved in water to the mixture. This will clear or precipitate the last traces of lime from the solution and the result will be a clear solution of hypochlorite of soda free from lime. Now, while this mode of working hypochlorite of soda will answer very well, it is a clumsy and tedious, as well as an expensive process, and not to be recommended where electrolytic bleaching is available and bleaching by electrolysis is always readily and economically available where the electric light is used, and where the electric generators would otherwise be idle during the daytime, and this applies with added force when cheap water is the motive power.

When a current of electricity is passed through an aqueous solution of Sodium Chloride, the alkaline metal at once reacts with the water, so that a solution of an alkaline hydrate is formed while chlorine and hydrogen escape. The chlorine gas escapes at the anode or positive electrode, and the hydrogen escapes at the cathode or negative electrode, the solution of alkaline hydrate being left in the liquor. If, however, the chlorine gas and the sodium hydrate are allowed to act upon each other within the liquid in the electrolyzer, thus being an excess of sodium hydrate, the immediate result is the formation of sodium hypochlorite, accomplished by simply placing the cathode over the anode so that the chlorine in rising must pass through the solution of sodium hydrate which is formed and be absorbed.

We have not the space here to describe the electrolyzer in detail, it is, however, on the market in various forms. Generally speaking, the tank in which the cell of the electrolyzer is placed is filled with a solution of common salt containing about 1½ pounds of salt to each gallon of water. The current is turned on and allowed to remain for two

or three hours. No skilled labor is required, and if the same strength of electrolyte, same current, and same length of time are used, the resultant bleach liquor will be always the same strength and composition.

An apparatus, occupying a space about 45 inches long, 30 inches wide and 35 inches deep will produce in 10 hours 252 gallons of hypochlorite solution containing an equivalent of 91 pounds of chloride of lime.

The upkeep of the electrolyzer is easily maintained. There is nothing to wear out except the electrodes, which are of carbon and inexpensive. There are no moving parts to get out of repair. The operation is so simple that any ordinary boy can run it. It requires no supervision after being once adjusted, it practically runs itself.

The current is turned on, a vigorous evolution of hydrogen gas ensues which causes a constant circulation to be kept up and no other means are used to give the liquor all the circulation that is required. The current used must be a continuous one of say, 110 volts, and may be taken from the regular lighting circuit. Beyond the electrolyzer no particular electric apparatus is absolutely necessary, although it may be desirable to have a volt meter and an ammeter at some convenient point to indicate the condition of the electric current.

The question as to whether it will pay to use this method or not is one that every user of bleach must decide from the conditions prevailing at his factory: where water is plentiful and easily available and the power from it can be used to run the dynamos there is no doubt of its economy, for with electricity at anything less than one cent per unit, the electrical bleach is cheaper than bleaching powder.

But aside from all questions of economy, the electrolytic bleach possesses other advantages of such a very marked character, that its adoption and installation is almost essential to the successful production of effects and result required by the trade for the bleaching and finishing of certain lines of goods, and in no other case are its advantages more marked than that of Turkish towels and knit goods.

There is no waste of chlorine and therefore no unpleasant vapors in the bleachroom. The electrolyzing apparatus is perfectly clean and can be located at any point in the works—even in the office if desired—so far as all cleanliness or smell is concerned. It's absolutely reliable and saves steam, water, and materials. The machine never varies in its results. It must produce a liquor of uniform strength. For Turkish towels and knit underwear, the electrolytic bleach is the only method that should be used. These goods require to be soft and elastic and full and lofty to the feel, they should not crackle when pressed between the hands, and should be strong and elastic in their texture and keep their color in the cases.

Lime, used at any stage of the bleaching process, either in the boiling or subsequently in the chloring, is fatal to any of the above requirements, as is also, to a lesser degree, the subsequent application of acid in the souring. Both of these objectionable features, (the lime and the acid) are absent in the electrolytic bleach, washing alone being usually sufficient to clear and finish off the goods.

A bleacher should always bear in mind that it is much safer and better to chemic the goods in a weak liquor for a longer time than it is to submit them to the action of a strong liquor for a shorter time, we shall, therefore, chemic our towels at ¾ degrees Twadell and let them lie in the vat all night.

To accomplish this we shall build a tank or cistern of cemented brick beneath the floor level to contain our chemicing liquor at ¾ degrees T., above this we shall build our vat for the goods, also of cemented material, this latter to have a false bottom to drain into the vat below. As soon as the goods commence running into the vat built for them start the centrifugal pump and keep the liquor circulating all the time the goods are running and for one hour afterward, then stop the pump and allow the goods to lie all night.

In the morning, if the goods are not white enough, turn them over the reels (not through a machine), into another vat and start the pump and circulate the chemic as before.

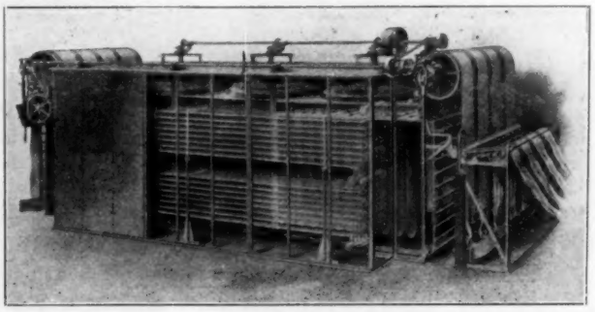


FIG. 1. A LOOP DRYER IN OPERATION.

These goods can be dried right out of the chemic, but if it is desired to wash them, plug up the outlet in the bottom of the vat leading into the stock cistern of chemic underneath, and open the outlet to the sewer, after first filling the vat with clean water, this may be repeated if necessary at will, or, the water can be circulated by means of the pump. Do not, under any circumstances, sour the goods after chemicing. The goods, if bleached with the electrolytic, or with the chemically compounded hypochlorite, will have an alkaline reaction and are therefore better if blued with an ultramarine blueing. This may be done in a light

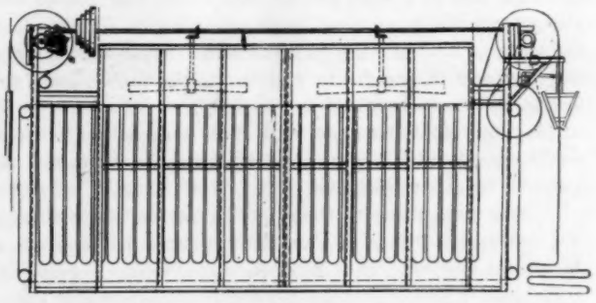


FIG. 2. . .A SECTION OF THE TRAVEL OF THE FABRIC.

wringer, having the roll lapped with slasher cloth, or through a trough and light squeeze rollers attached to the drying machine; if, however, the latter course is pursued, care must be taken to run the dryer always at a uniform speed or the shade of the blueing will vary with the speed, also that no stoppages occur, as each stop will make a blue bar across the goods.

As ultramarine is a dense substance, insoluble in water, being merely held in suspension, care must be taken to keep it stirred all the time the operation is going on. This may be accomplished by providing the bottom of the blueing trough with a spiral rotating continually in the bath. As ultramarine does not mix readily with water, it is bet-

ter to moisten it first with alcohol, which also prevents any lumps from forming. The towels must be passed through exactly at full width and without wrinkles or creases. The slightest fold causes irregularities in the color.

Upon the drying depends in a large measure the proper finish and feel of the goods. If the goods are dried in contact with any hot drying surface such as steam cylinders, or by hot, dry air, or under any kind of tension, they will be harsh and stiff and the pile will be flattened and permanently depressed. A system has been desired, therefore, by which the goods are dried in a moist air while suspended over rails in loops and in contact with nothing except just at the point where they touch the rails. Figure 1 shows the machine with the side doors removed to show its inside working arrangements. Figure 2 shows a sectional view of the same dryer.

The goods are fed into this dryer by a positive feeding arrangement on which the rolls are very large in diameter and will thus tend to prevent any possible slipping of the material. As the goods enter the drying compartment they are looped over a conveyor, by which they are slowly carried through the drying air currents. The air which dries the fabric is heated by means of coils of steam pipe located in two separate compartments, one on each side of the drying space, or conveyor passway. This air is recirculated through the steam coil and wet material over and over again, thus always carrying a small amount of moisture which prevents baking the goods into a "bone-dry" condition, and this conditioning of the goods in moist air is of the greatest moment to the weight and feel. By recirculating the warm air through and through the wet material and heater coils the volume of cold air it is necessary to heat is comparatively small, which results in obtaining the maximum quantity of dry material with the use of the minimum amount of steam and therefore at the minimum of cost. Of course, a certain amount of moist air is taken out continually by means of an exhaust fan so that the air in the dryer never reaches the dew point. The towels come out of the dryer perfectly flat and without any wrinkles, and in a nice, soft condition. A machine of this character usually requires only one man to run it, dries the material in from ten to forty minutes, depending upon the thickness of the goods, and leaves the fabric open and elastic and the pile raised and fluffy.

A thirty-foot machine will dry approximately from 6,000 pounds to 8,000 pounds of towels in 10 hours, depending upon the thickness.

There are other matters pertaining to the finishing, weighting and filling of Turkish towels; quick systems of bleaching and weighting by means of various sizings and softenings which cannot be discussed in this present paper, being wide of its intent and purpose, but which we may make the subject of another article in the near future.

The lesson would seem to be that we must not only go on improving safety devices, but, of even more importance, keep always in mind the supreme weight of the human element. If man relies too implicitly on his elaborate devices to prevent accidents, he is courting disaster. As in navigation, so in other affairs of life and trade. The machine, the system, the method all may be wonderful, but they must not be developed at the expense of individual skill, initiative, courage and responsibility.

Don't be afraid of being turned down.

NAPHTHOL A S AND ITS APPLICATION IN DYEING AND CALICO PRINTING.*

BY FELIX KUNERT AND E. ACKER.

In 1878 Peter Griess discovered the highly interesting reaction of nitrous acid on aromatic amines, such as aniline, toluidine, xylidine, etc., in an acid solution, and noticed that the resulting diazo compounds formed strongly colored dyestuffs with napthols and phenols. In 1880 the firm of Read Holliday and Sons first made the principle of the production of insoluble azodyestuffs of the fiber the subject of a British patent application. Then followed a German patent by Grassler, of Cannstadt, and in 1887 Weber, of Winterthur, introduced these colors for piece-dyeing, but had to cope with great difficulties. Only two years later—after Galland and van Gallois had improved the method of application, especially for calico printing—the color makers—first, the Farbwerke Hoechst—started the manufacture of paranitraniline, and were, at the beginning, scarcely able to satisfy the large demand which came from Russia. The firm of K. Oehler, Offenbach (now amalgamated with the Chemische Fabrik Griesheim-Elektron), put on the market paranitraniline in a purer form, and since then the manufacture of other azo bases has been gradually taken up. After Kochlin in 1889 had worked out the process of application for calico printing, the stable diazo compounds were introduced—*i.e.*, the Azophor colors (M.L. and B.), the Nitrosamine colors (B. A.S.F.), and other similar products. As early as 1889 beta-naphthylamine was used for an imitation Turkey Red, and in 1890 nitrotluidine and nitrophenetidine, etc., were utilized; but it was not until 1893 that dianisidine was used for blues, and benzidine and tolidine for browns. The largest consumption of these new dyes was in the calico-printing industry and for piece-dyeing, while the first commmunications relative to their application for yarn dyeing were only published during the years 1895 to 1896.

The most important product for use with these diazo compounds was always beta-naphthol. The fiber is first prepared or impregnated with this, then dried, and the color developed with the diazotised base. In calico printing the diazotised base is printed with a suitable thickening on the prepared and dried cloth. Alpha-naphthol was also sometimes recommended, principally for the production of brown shades, and also the dioxynaphthalenes and aminonaphthols, with yield with paranitrodiazo-benzene salts very deep shades, principally blacks. But it was not until Stork succeeded by means of the copper lake in rendering the Dianisidine Blue fast to light that the interest in such blues was aroused. The Hochst firm then bought out their Naphthol D (beta-oxynaphthoic acid), designed to make Dianisidine Blue fast to acids, which is not the case with the beta-naphthol compound. It was found, however, that the Naphthol D increased the fastness to acids only very slightly, and consequently Dianisidine Blue was taken up by the trade on a very limited scale. Therefore, while red, principally Para Red, was used for the dyeing of yarn, and also to some extent for cops in the machine, it was not possible to dye a blue of any value on these materials.

By means of a new process which the Chemische Fabrik Griesheim-Elektron has invented and patented ,this is now possible. Naphthol A S—which is an arylide of beta-oxy-

*Paper read before the Society of Dyers and Colorists.

naphthoic acid—is a new product with possibilities of application hitherto unattainable with beta-naphthol or its substitutes. By the use of this body the most brilliant dyeings of all shades (except a pure yellow and green) can be produced on yarn, pieces, cops, cheeses, etc., of surprisingly good all-round fastness, and more quickly than with beta-naphthol. The chief characteristics of the new process are the unsurpassed brilliancy of the dyeings, their fastness to rubbing, and the fact that a blue of commercial value can be produced. Another striking feature of the Naphthol A S process is that it is not necessary to dry the prepared yarns or cops before developing. The chief reason for this is the quickness with which the coupling on the Naphthol A S prepare takes place; but a second reason is found in the substantive-dyeing qualities of the Naphthol A S towards the cotton fiber. By the use of dianisidine on Naphthol A S prepare, a blue is obtained which not only possesses the very good fastness to light (surpassing even that of Indigo) of the old Dianisidine-beta-naphthol Blue, but also a fastness to acids and perspiration sufficient for all purposes.

The fastness to alkalies and soaping is also very good, and to chlorine excellent. The reds dyed on Naphthol A S prepare show considerably greater fastness than the well known Para Red on beta-naphthol. The fastness to rubbing is very good, and the fastness to light in certain cases remarkably good. For instance, the fastness to light of the color obtained with Fast Red G Base is excellent, approaching that of Alizarin, and surpassing by a long way that of Para Red and of all substantive red dyes. As already indicated, a surprising feature in the application of Naphthol A S is that the coupling may take place without previously drying the yarn. The material may, however, be dried if necessary—*e. g.*, in piece-dyeing this is usually done, as with beta-naphthol, in order to increase somewhat the fastness to rubbing.

The production of these colors by the new method, which has been patented in all civilized countries, is done very quickly on all cotton goods. The material is impregnated, squeezed, hydro-extracted, and dyed, and only in piece-dyeing is the padded material dried. Reds by this process are obtained in as many hours as Turkey red requires days. The saving in time is, therefore, enormous.

Naphthol A S is easily soluble in alkalies. As with beta-naphthol, it is dissolved in hot water with the necessary quantity of soda lye and Turkey-red oil. If the prepare is to be used for yarn or for dyeing in apparatus, it is best to add to the lukewarm Naphthol A S bath some formaldehyde (half the quantity of the weight of the Naphthol A S used), as hereby the wet impregnated material is rendered more stable and the yarn dyes more evenly, and all risk of streaky and blotchy dyeings is obviated. Instead of Turkey-red oil, ricinoleate of soda can be used in many cases, especially for blues, and for reds of a bluish cast. Also the "red oils" of a strongly acid character—which are on the market under the names of Monopol soap, Turkon oil, etc.—are suitable, and when dyeing loose cotton are to be preferred, as they prevent the formation of lime soap. It is, however, of the greatest importance that the soda salts of Turkey-red oils and never the ammonia salts, be used, as the latter give unreliable results. In order to prevent frothing, an addition of some turpentine to the bath is advisable. The Naphthol A S baths keep several days, and if they do not contain formaldehyde, should be boiled up before use.

In the preparation of the diazo solutions the base is dissolved in warm hydrochloric acid, and after having been cooled down with ice, a solution of nitrate of soda is gradually poured in. It is important to allow the diazo solutions to stand for about half an hour before they are neutralized and used, this being especially necessary when Fast Scarlet G Base and Fast Red G Base are used. The neutralizing of the hydrochloric acid is done with acetate of soda, with the exception of Fast Red G Base, for which chalk or other carbonates are used. Diazo solutions should only be prepared in sufficient quantity to be used up during the day. By an addition of sulphate of alumina the diazo solutions become more stable, other salts, such as ammonium chloride and Glauber's salt, having a similar but less action. Frothing is prevented by an addition of a few drops of Turkey-red oil.

The principal difference of the new process from the old method of dyeing yarn with paranitraniline lies in the fact that no drying of the yarn between preparing and dyeing is necessary. Drying may be done (on condition that formaldehyde was added to the bath), but the extra expense is unnecessary. It is essential that the yarn be well impregnated, evenly stretched, and sufficiently squeezed. It is of the greatest importance that only well-squeezed yarn be passed through the diazo dyebath, in order that dyeings of good fastness to rubbing may be ensured; therefore, after wringing, a subsequent hydro-extracting is desirable, especially if the impregnation has been done by machinery, which never wrings as thoroughly as an experienced workman can do by hand. Mercerized yarn requires weaker naphthol solutions, because of the slightly substantive dyeing action of the Naphthol A S. For this reason also a feeding solution which is one-sixth more concentrated than the original has to be used. The impregnated and well-squeezed or hydro-extracted yarn, containing not more than 50 to 60 per cent of moisture, must be dried as quickly as possible, for uneven drying leads to irregular results.

In dyeing, the yarn is entered into the diazo bath, given a few turns, squeezed, washed thoroughly, and soaped hot. The fastness to rubbing is greatly influenced by the soaping, which must be done very thoroughly, so that all excess of dyestuff formed on the fibre is removed. If the prepared yarn is well squeezed, the feeding quantity will be about 400 to 500 cc. for each 2lb. of yarn. For preparing the yarn the same impregnation machines as used for Turkey Red are suitable, but as these machines do not wring the yarn as thoroughly as can be done by hand, a larger quantity of naphthol solution is required, which, however, is regained by the hydro-extracting. The dyed yarn must be washed directly after dyeing, which is particularly necessary with Fast Red G Base and Fast Scarlet R Base, the diazo solutions of which decompose somewhat easily, and an addition of 25grms. sulphate of alumina per litre is recommended.

The process may be simplified and better fastness to rubbing obtained without hydro-extracting by the use of the special Obermaier apparatus. In dyeing on the yarn by this process the naphtholated material is treated with organic acids (*e.g.*, acetic acid), or with salts (*e.g.*, acetate of soda, phosphate of soda, etc.), and then dyed. An after-treatment with hot water will also help completely to develop the dyed shade.

It is advisable to boil the cotton with soda or caustic soda before dyeing, as thereby the penetration of the preparing liquor is much facilitated and the possibility of streaky or uneven dyeings greatly reduced. The dyeing is done exactly in the same manner as with paranitraniline on

yarn. The preparing with Naphtol A S and the developing in the diazo bath should be done in wooden vessels—of the same form as are used for mordanting with Turkey-red oil—holding about 20 to 25 litres. There are first required standard solutions of Naphthol A S and of the base, for the starting bath, and these first solutions are subsequently fed up by additional solutions of higher concentrations after each 2lb. of yarn has been prepared, the Naphthol A S bath being replenished with 750 cc. of the feeding solution. The diazo bath through which the wet yarn, containing from 50 to 60 per cent of moisture, is passed, of course requires a smaller volume of feeding liquor of higher concentration. If the original bath contains 7½ grms. Fast Red G Base per litre this, after dyeing each 2 lb. of yarn, will have to be fed up with 400 cc. of a solution containing 30 grms. of the base per litre.

If the dyeing is done by hand, an experienced workman can easily dye 500 lbs. of yarn within ten hours. It is more rational, however, to have the preparing with Naphthol A S done by machinery. These machines have two baths for preparing, and the squeezing of the yarn is either done by rollers or a special wringing mechanism is provided. Within ten hours about 1400 lb. of yarn can be prepared. After impregnation, the yarn must be hydro-extracted to prevent the dyeings from rubbing. Since the introduction of Naphthol A S a new product, Naphthol N A, has been brought out, which is not yet on the market. This is also an arylide of beta-oxynaphthoic acid, and produces very brilliant pink shades with Fast Scarlet R Base.

For blacks, the yarn is first dyed with Fast Orange R Base, dried, then prepared again with Naphthol A S, and re-dyed with dianisidine, or Dianisidine Blue may be topped with Fast Orange R Base. The black is very fast to chlorine. The other fastness properties of this black are likewise satisfactory, and it has been taken up largely as a much cheaper substitute for Indanthrene Black. Yellowish-brown shades may also be produced by topping Fast Orange R Base with a light Dianisidine Blue.

Provided the work is done properly, it is characteristic of Naphthol A S that standing of the diazo bath is avoided, thus proving in the first place that Naphthol A S is fixed on the fiber much more firmly than beta-naphthol, and secondly, that it couples with the various bases very quickly. Even after 100 pounds of Naphthol A S prepared yarn has passed through, the bath is scarcely tinted. With Fast Scarlet R Base and Fast Red G Base an addition of 25 grams sulphate of alumina per litre is required to prevent the formation of dyestuff in the bath. When dyeing yarn which has been dried after preparing, an addition of 20 to 40 grams dextrine per litre is recommended. All dyeings obtained with the new naphthols with the different bases are bluer than those on beta-naphthol, with the sole exception of paranitranline, with which they produce somewhat yellower shades than beta-naphthol.

The shades of the most important bases recommended for the new naphthols are as follows: Fast Orange Base yields a yellowish-orange: Fast Scarlet G Base a most vivid and brilliant orange-red; Fast Red G Base a perfect Turkey-red shade; Fast Scarlet R Base an exceedingly fast scarlet, and, by a suitable combination of Naphthol A S and N A, any shade of Turkey Red from the bluest to the yellowest shade of unsurpassed fastness can be produced; Fast Red R Base gives a very bluish-scarlet; Fast Red B B Base a yellowish-red; Fast Red B Base a very bluish-red or pink; Fast Garnet G Base a deep bordeaux; Fast Scarlet B Base a Turkey-red shade; Fast Corinth B Base a brown; and Fast Dark Blue B Base a dark blue. All these colors have been taken up commercially. The red is the most important, and has found the largest sale, as it is cheaper, and even somewhat better to rubbing and faster to chlorine than Turkey Red.

These colors can readily be dyed in cop-dyeing apparatus. Up to now the application of the azo colors in machine-dyeing has been exceedingly limited; cops can certainly be dyed with paranitraniline, but there is the great drawback that the prepared cops must be dried, and generally, before they have become thoroughly dry, the outside is more or less brownish. The great advantages which the dyeing in the apparatus offers, such as saving in labor and in dyestuffs, preserving of the material, etc., have made this method of dyeing very popular, and these new dyestuffs are excellently adapted for machine-dyeing.

With Naphthol A S a method of dyeing quickly and cheaply red, garnet, blue, and orange shades of excellent fastness on cops, cheeses, and warps has been developed. In comparison, the dyeing of Turkey Red on cops and cheeses is not at all easy, and even on yarn and warps the method of dyeing is complicated, the cost is higher, and, furthermore, it is impossible to produce quickly such large quantities as with azoic colors, so that Turkey Red cannot claim the same advantages which the azoic colors offer. The cops, cheeses, or flyers, previously boiled off, are impregnated with the Naphthol A S solution, the liquid is sucked off well, and, after hydro-extracting, the diazo solution is pumped through. For machine-dyeing somewhat weaker solutions of Naphthol A S and of the diazotised bases are taken, so that the dyeing works out very economically. For deep shades, 6 grams, or at the utmost 9 grams, Naphthol A S per litre are sufficient, and the diazo solutions contain on the average only 6 to 7 grams of base per litre.

The principal point of consideration for machine-dyeing is the apparatus itself. Generally speaking, any apparatus of the spindle system is suitable— *i.e.*, an apparatus in which the cops or cheeses are fixed by means of spindles on to a tray through which the liquid circulates. It is desirable that the liquor should be able to circulate in either direction, and that the suction be done thoroughly by vacuum. After sucking off the liquor (which is used again) the goods are hydro-extracted, put back again into the apparatus, the diazo solution pumped through, and after sucking off again, the goods are given a good washing and soaping. Hard water must not be used, as the resulting lime soap will stick to the cotton. Good spinning properties are best secured by using as small a quantity as possible of Turkey-red oil in the Naphthol A S prepare, which should be on the average not more than 3 to 5 grams per litre.

The packing system is not to be recommended, except for loose cotton, in which case, however, the inner receptacle holding the material must be detachable, so that it can be taken out of the machine and hydro-extracted. The principal points to be observed to ensure a good result are powerful pumps, an even and regular circulation of the liquor, a perfect vacuum, and a short bath, if possible in the proportion of 1 to 8. Any apparatus fulfilling these conditions may be used for the dyeing, and machines with loose spindles are to be preferred. By the apparatus above mentioned, cops, etc., are now dyed regularly with the greatest success.

The new method is admirably adapted and extensively employed, principally in England, for dyeing warps on the continuous warp-dyeing machine. The impregnation and dyeing of the warps are done in these machines in one operation, though, of course, the warp may be prepared on a separate machine. In a good continuous method the warp passes first through the first hole containing the Naphthol A S solution, is then squeezed with a nip regulated so as to leave only about 50 per cent of moisture, is then run through the second hole containing the diazo solution, is squeezed, passes over a few rollers to be aired, and is then in the succeeding holes of the machine successively sprayed with water, washed, soaped hot, and washed again. The vessel containing the naphthol solution is continuously replenished with the feeding solution, in order to keep the liquor always on the same level. The dyebath, which—*e.g.*, with Fast Red G Base—contains 7½ grams base per liter, is fed gradually with 16 litres of a solution containing 30 grams of base per litre for each 80 pounds of warp passed through. The liquor in the dye-vessels has always to be kept on the same level—*i.e.*, just slightly above the rollers,—and if this precaution is observed absolutely uniform results are obtained.

In piece-dyeing, the prepared cloth has to be dried, and for this a hot flue is almost indispensable. The drying may also be done on ordinary drying cylinders, but in this case the first few cylinders must be wrapped with cloth impregnated with Naphthol A S, and not heated too much. The risk of unsatisfactory results is, however, greater than when drying in the hot flue. Frothing is prevented by an addition of turpentine, 10 to 15 grams per litre. The naphthol solution is best kept in an elevated reservoir, from which it flows gradually into the vessel used for the preparing in such a way that the liquor is always at the same level. This is essential for arriving at uniform results. The temperature at which the pieces are prepared with Naphthol A S is not of such importance as with beta-naphthol, for the Naphthol A S does not sublimate. Even for prints, when the pieces have to be steamed, Naphthol A S gives good results at temperatures at which beta-naphthol is mostly sublimated. The colors are very valuable for piece-dyeing on account of their brilliancy and fastness. For instance, the red produced by Fast Red G Base, or the bordeaux by Fast Garnet G Base, though they do not perhaps quite reach the fastness to light of the corresponding Alizarin shades, yet excel in many other respects, especially with regard to fastness to chlorine. The blues show the same superiority in fastness to chlorine in comparison with the competing products. Owing to their very good fastness to soaping, the Naphthol A S colors are much superior to the direct red dyestuffs, and they are also absolutely fast to acids and alkalies. The fastness to rubbing is very satisfactory, after the dyed shades have been well soaped. The dyeings also stand hot pressing and Schreiner finishing.

If the dyeings have to be discharged, this is done by the stable hydrosulphites—*i.e.*, the special brands of Hydralite or Rongalite, which contain a catalytic agent to facilitate the reducing action. For blue the addition of anthraquinone as catalytic agent has proved the most satisfactory. The blue obtained on Naphthol N A is discharged to a particularly good white without difficulty. The blue from Naphthol A S, which is of a greener shade, can be discharged in light and medium shades; it is, however, of importance that the ageing machine can be made absolutely free from air and brought up to a temperature of 205 to 210 degrees F. The Naphthol N A also produces very vivid red shades, and it is used chiefly in conjunction with Naphthol A S for the imitation of Turkey-red shades.

Referring now to calico printing, the following typical methods may be distinguished:

1. The printing of thickened diazo solutions on prepared cloth.
2. The printing of Naphthol A S, as with beta-naphthol, and subsequent dyeing.
3. The discharge and resist styles.
4. Printing in combination with other dyestuffs.

In direct printing the so-called blue-red-white style is of great importance, and for this Dianisidine Blue, together with Para Red, could not be produced satisfactorily on beta-naphthol, as the former is not fast to acids. If Naphthol D (M.L and B.) is employed, which only increases the fastness to acids slightly, the shade obtained with paranitraniline is not a red but only a dull fawn. With Naphthol A S, however, a very good red and blue can be obtained. For the production of reds of bluer shade, Fast Red B Base or Fast Red R Base is used, the shade being bluer than that with beta-naphthol-para red style, with an addition of F salt. The pink and red shades obtained by means of Fast Scarlet R Base on Naphthol N A prepare are important for use in the Alizarin red styles.

All the bases recommended for dyeing can be used for printing. In color discharges, basic colors or vat-dyes—*e.g.*, Thioindigo Scarlet— may be added to the hydrosulphite discharges. As resists, tin-salts, potassium sulphite, ferrocyanide of tin, etc., are used, as with paranitraniline. To these resists, basic colors and tannic acid may be added to produce color resists. Blue-red resists may be obtained in two ways: first, by printing a concentrated diazo-paranitraniline solution, containing about 120 grams sulphate of alumina per kilo. of printing paste on the Naphthol A S prepare, and subsequently dyeing in a dianisidine-diazo bath, washing and soaping; second, by printing the dianisidine-diazo solution, containing about 40 grams ammonium persulphate per kilogramme on the Naphthol A S prepare, and subsequently dyeing in a diazo-paranitraniline bath; finally soaping and washing with an addition of some oxalate of ammonia.

Oxalate of ammonia may also be added to the diazo-paranitraniline bath, in which case very beautiful blue-red effects are obtained. In a good many cases, however, more vivid and violet shades, such as Modern Violet and Chrome Violet, together with Para Red, and sometimes even with basic colors, are desired, which prints will then require a passage through the rapid ager in order to fix the chrome or tannic acid lakes. When beta-naphthol prepare has been employed this ageing is often not satisfactory, owing to the tendency of beta-naphthol to sublimate. For this style, therefore, Naphthol A S is ideal, for even after steaming for five minutes no sublimation takes place and the Para Red is perfect.

Ice Black Base also deserves special mention. This, on Naphthol A S prepare, gives a deep bluish-black, which even with the finest engraved designs retains its deep black effect. With Fast Red B Base and Fast Scarlet R Base, especially on the Naphthol N A prepare, pink shades are produced which surpass in brilliancy those obtained with Alizarin. Naphthol A S may replace Turkey Red in the white discharges of red dyeings by Hyraldite, and in the direct printing of brilliant reds and pinks from the Fast Scarlet Bases on Naphthol A S and N A prepare.

Finally, the white discharge work of Dianisidine Blue on Naphthol N A (which yields a somewhat redder shade than on Naphthol A S) is of interest, as this blue, which is of excellent fastness, can be dyed for stock and discharged when required. The good fastness to light of this Dianisidine Blue is largely dependent upon the formation of the copper lake, and an addition of copper chloride to the dianisidine-diazo solution must always be made. The Dianisidine Blue is superior to Indigo in many respects; its fastness to rubbing and chlorine is better, it can be produced in a simple way, and a tendering of the fiber is impossible. In reviewing the varied means of application of the new naphthols in all branches of dyeing or printing, it cannot be denied that there is scarcely a product which will fulfill so many requirements. For the dyeing of loose cotton, warps, cops, cheeses, yarns, for piece-dyeing, or for the complicated process of calico printing, in every case Naphthol A S and its compounds seem destined to replace older products.

BLEACHING COTTON PIECE GOODS.

BY S. W. B.

THE LIME BOIL.

To make an intelligent study of the art of bleaching, we should first thoroughly understand the fibre which is given us to bleach.

In following out this idea we will first take up the natural and artificial impurities found in cotton cloth and which we propose to remove by boiling, souring and chemicing, leaving as near as possible, pure cellulose, which is white.

Schunck gives the natural impurities in cotton as follows:

First. Cotton wax, a wax strongly resembling carnauba wax. Cotton wax is insoluble in water, but soluble in alcohol or ether and melts without dissolving in boiling dilute caustic soda.

Second. A mixture of palmatic and stearic acids. Palmatic acid in combination with glycerine constitutes the greater percentage of palm oil while stearic acid in combination with glycerine is met with as tallow. This combination of acids was formerly called margaric acid. Both of these acids combine with caustic soda or soda-ash to form palm-oil soap and tallow soap respectively.

Third. Two brown nitrogenous coloring matters. The different colors of cotton are undoubtedly due to a great extent to the varying amounts of these coloring matters present. These two compounds are destroyed during the bleaching by "chemic."

Fourth. Pectic acid, an acid which resembles gum or gelatine. Pectic acid is present in almost all ripe fruits and is soluble in water and dilute solutions of alkalies.

Fifth. Aluminous matters, compounds after the nature of blood or egg albumen; coagulated by heat and soluble in acids.

Pectic acid is present in the largest quantity, followed by the albuminous matter.

The natural imprities present total about 5 per cent on the weight of the cotton. This is further proved by the fact that cotton knit goods which are made from unsized cotton yarns loses about 5 per cent during the bleaching.

With the exception of pectic acid none of these impurities are soluble in water but all of them either mix with or are soluble in organic solvents, such as ether, alcohol, chloroform, carbon disuphide, etc., which explains why it is so difficult to wet-out raw cotton in water while oils or organic solvents of any kind are instantly absorbed by the cotton.

The only artificial impurities of any importance are starch and tallow or tallow substitutes added to assist in the weaving.

Starch is insoluble in cold water but when boiled the granules swell up and burst, the contents of the cell dissolving while the cell wall is insoluble. Starch is converted into dextrine and finally glucose by acids, both of which are soluble in water and into "soluble starch" by caustic alkalies.

Corn starch is used almost entirely in the sizing of warps as it gives a good stiff paste and at the same time is the cheapest starch.

Corn starch by itself would make the warp too stiff and non-elastic so tallow or some fat or oil is added to the sizing mixture to soften the effect of the starch.

Tallow is very largely used for this purpose not only doing its work well but being very easily removed during the bleaching. Tallow substitutes always have the virtue of being cheaper than tallow but are always "just as good."

Tallow substitutes do not cause any trouble providing they are made from oil or fats which can be removed during the boiling, but are a source of trouble in both bleaching and dyeing if they contain petroleum products that will not saponify.

Weavers sometimes wax the warp with parafin wax if they are having trouble with ends breaking but this should not be allowed as parafin wax cannot be removed by bleaching and is liable to show as yellow spots or streaks in goods finished white while acting as a resist on some colors and as a mordant on others during dyeing.

The percentage of artificial impurities varies quite a little, depending on how heavily the warps are sized. 3.5 yard 48 x 48 sheeting will average around 4 per cent of sizing.

Removing these natural and artificial impurities, leaving, as near as possible, pure cellulose, constitutes the art of bleaching.

From the foregoing it is plain that bleaching does not *add* anything to the cotton, but on the contrary takes something away, consequently the goods weigh less after bleaching than they did before; on average goods the loss will amount to around 9 per cent.

Unless (and this point cannot be too strongly emphasized) all this foreign matter is *removed* by being boiled with various chemicals until soluble, no permanent bleach can be obtained, so we come to the boiling out, the foundation of all bleaching,

There are two general methods in use today, one with slaked lime, the other with caustic soda.

In boiling with lime an amount equal from 0.8 per cent to 1.5 per cent on the weight of the goods is used. There are a number of reasons for this large variation in the quantity of lime used that may not appear on the surface and which will not, when all conditions in each individual case are known, seem so irrational.

One commission bleachery doing 18 lime lots or about 135,000 pounds a week, uses around 1100 pounds of lime or slightly over 0.8 per cent. Another doing 32 lime lots, or about 265,000 pounds a week used around 3500 pounds

of lime, a little over 1.3 per cent. Another doing prints entirely uses 1950 pounds of lime on 190,000 pounds of goods, a little over 1 per cent.

The writer has read many so-called authorities who recommended amounts varying all the way from 3 per cent to 12 per cent, but never knew of a case where a bleacher who knew his business used over 1.5 per cent.

An old-time bleacher who tackled everything that came along and helped build up the reputation of the largest commission bleachery in New England, claimed that 1 per cent of lime was sufficient for anything providing the succeeding processes were intelligently made use of. Using 12 per cent of lime on 265,000 pounds of goods would certainly boom business for the lime burners.

It is customary to use two tanks, each tank containing an agitator for slaking the lime. Each tank may be about

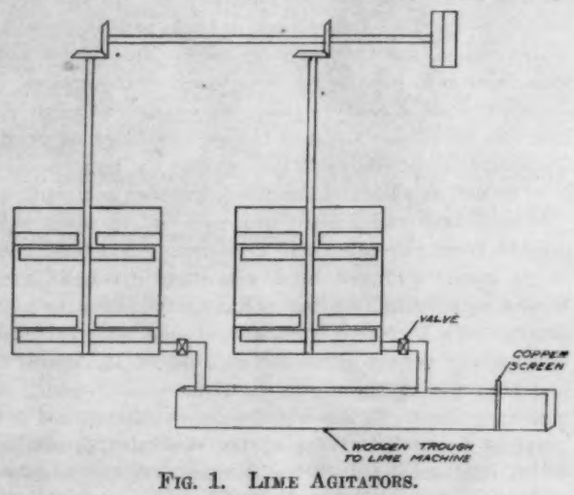


FIG. 1. LIME AGITATORS.

4 feet in diameter and 4 feet deep and will hold around 360 gallons. Fig. 1 gives the arrangement used in one large bleachery very satisfactorily.

The milk of lime should run into the limeing machine at the same end of the machine that the cloth goes in as it thereby has a better chance to work into the goods than if it run in at either the center or going-out end.

The slaking tanks should be about ¾ filled with water and the agitator started, then add 4 small (96 lb.) barrels or 1 large (300 lb.) barrel and agitate for at least 6 hours; a whole day is better. Even after agitating a whole day there will be unslaked particles left which look like sand and unless these are strained out trouble is sure to result from holes. The milk of lime must be passed through the finest copper screen obtainable before being run into the lime machine.

The agitators are usually made to run continuously all the time the mill power is on because we are either slaking the lime or else keeping it stirred up while it is being run into the lime machine. It is possible with this two tank arrangement to take care of 30,000 pounds of goods a day, always having one tank of lime on hand that has been agitated a day.

Knowing the amount of lime and the quantity of water in each tank it is only a simple calculation to figure out how many inches of the milk of lime to run out of these tanks to get whatever percentage is wished for on the goods.

The goods are taken from the "grey room" after being sewed together and run through the lime. As the goods are dry they soak up more liquor than the small stream of lime trickling in can supply, so sufficient water is added to keep the reel in the bottom of the lime machine completely covered.

It may not be out of place at this time to add that a solid wooden roll should not be used in the bottom of the lime machine. A reel made from 6 3 x 3-inch maple bars fastened to a "spider" which is keyed onto a shaft keeps the liquor in the machine stirred up much better. Figure 2 is an end view of this reel.

One ingenious but misdirected bleacher the writer is acquainted with, made up his lime in barrels alongside the lime kiers, ran the goods through an ordinary wash ma-

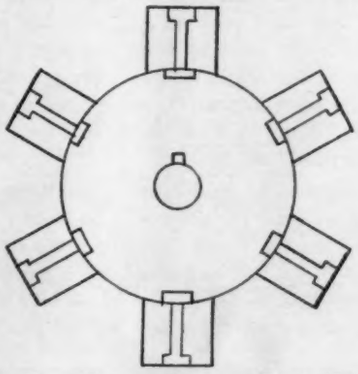


FIG. 2. END VIEW OF REEL IN LIME MACHINE.

chine into the lime kiers, at the same time having a man spray the milk of lime onto the cloth in the kier and he wondered why he was always having trouble with holes, tender places and stains in the goods.

Different bleachers have different ideas as to how much water should be added to the kier for the boil. Some completely cover the goods with water while others add just sufficient to insure continuous circulation. The style of kier and the condition it is in has a great deal to do with this. A deep, narrow kier should have more liquor than a wide, shallow one of the same capacity because the liquor will not seep through a deep one as easily as it will through a shallow one.

Thirty inches of water in a low pressure center vomit pipe kier will give a continuous circulation. Forty-two inches in a high pressure kier should be enough if the kier is working right. Of course, if the kier isn't working right, if the liquor is not thrown over the top often enough, the top of the lot would become dry, with tender goods as a result. In that case the goods would have to be completely covered with water to be on the safe side.

The goods are boiled in the lime for 20 hours at low pressure (low pressure means no pressure showing on the steam gauge and having a vent to the atmosphere) and 10 to 12 hours in a high pressure kier at 15 pounds.

The writer has seen goods boiled as high as 60 pounds but considers 15 pounds the best working pressure, everything considered. A gauge pressure of 15 pounds is equal to a temperature of 250° F., while 60 pounds is equal to 307° F. Theoretically the goods should be cleaned much quicker at 307° F. than at 250 ° F. but in practice we would have to boil just about as long in both cases to be sure that we had an *even* boil.

No distinction is made in the length of time given be-

tween light and heavy goods because a kier holding 8,000 pounds of light goods would hold the same amount of heavy goods, even though the yardage may be three times as great on the light lot. The amount of lime soaked up by light goods is less per yard than the heavy, still the total pounds in both cases would contain the same amount of lime.

It takes about 10 hours however high the pressure to be sure of an even boil whether the goods are light or heavy. To the writer's knowledge goods running all the way from 12 ounce shoe duck up to goods as fine as 11 yards per pound have been lime boiled as described to the extent of upwards of 10,000 tons without having a tender piece.

In a bleachery using the lime boil judgment should be used as to what goods should have the lime. All "pure starch finished" goods should have the lime but it is a waste of time and money to lime any "heavy filled" goods. Filling of any kind such as tale, sulphate of lime, china clay, etc., always detracts from the purity of the white and no matter how white the goods are before being "heavy filled" they always appear the same color as the filling and are dead and dingy by comparison, so a soda boil is enough for "heavy filled" work.

As care has to be used in doing anything to secure the best results so must certain things be looked after in limeing. If the lime isn't well slaked or if the strainer becomes broken small holes will be burned in the goods wherever the unslaked lime touches; if the top of the lot gets dry for any reason or other, pin holes and tender goods will be the result.

Another small detail which some bleachers do not realize the value of is in not putting the cover on the kier until after the steam has been turned on and the liquor almost brought to the boil. The kier contains a large amount of air, both in the water and in the folds of the cloth. Air in the presence of boiling lime water always has a tendency to produce oxycellulose or tender cotton. Air in a kier can do no good and can do a great deal of harm, so the best way is to get rid of as much of it as possible by leaving the cover off as long as we can without filling the room with steam. Even after the cover is on the vent pipe to the atmosphere should be left open until the kier does come to the boil.

Reverting back to the impurities present let us see what effect the lime has had on them. All the fats and oils present are converted into the corresponding insoluble lime soaps. The cotton wax, cotton-seed oil, tallow, stearic and palmatic acids are not rendered soluble by the lime and are still present but in a form which can be easily removed by the brown sour and soda ash boils. Almost all of the starch is removed by the lime.

One experimenter has proved that the cotton wax is saponified, or converted into a soap, in 2 hours and tallow in 4 hours by milk of lime at a temperature of 250° F. or a gauge pressure of 15 pounds. Caustic soda took twice as long to do the same thing under the same conditions.

The modern tendency is to do away with the lime boil whenever possible for while lime itself is cheap the goods after limeing must have at least one soda ash boil with an acid treatment or brown sour in between the two boils, together with a wash before and after the sour so the necessary following processes makes it rather expensive in chemicals and steam besides requiring more machinery and kiers and also taking more time to run through a bleach. But goods well bottomed with lime can not be equalled in clearness, whiteness or permanency by caustic soda or anything else. Bleachers who have changed over from the lime to the caustic appreciate the convenience of the caustic boil but realize that it is at a sacrifice of quality.

INDIGO BLUE CLOTH WITH LIGHTER BACK.

For a long time dyers and printers of certain indigo styles have been in the habit of dyeing the backs lighter than the face. It is probable that this practice originated in the wish to economize the dye. Then it was claimed that the difference between the two sides was a proof that indigo had been used, and that, as indigo dyeings are not very fast to rubbing, this method gave some warranty against bleeding on to other fabrics.

When the older vat dyeing process is adopted, the back of the piece is lighter than the front, but it is very unlevel and full of more or less dark-blue patches. In this method the pieces are dyed folded back to back, so that the indigo cannot impregnate the two sides alike. The results would seem failures to persons not accustomed to the process, but the cloth finds a ready market for export, although it is true that the market for it in Europe has fallen off greatly. Customers are beginning to require that the back should be level as well as pale, and this result has been achieved.

The Schaab and Ribbert processes had no other object than to economize labor and accelerate production, giving to the reserve sufficient solidity to stand dyeing in a continuous vat. Schaab's patent is based on padding the pieces, printed with a reserve, with a thickened color containing carbonate of potash or caustic soda lye of 15 degrees Be., and then dyeing them in a continuous vat, souring and rinsing as usual. In this way the reserve is hardened to the point of being able to resist the successive pressures to which it is subjected during dyeing. On the unreserved parts the caustic soda exerts a mercerizing action, thus conferring on the cotton an increased affinity for dyes. These places will thus acquire the dark shade required, while the back will be paler and uniform to boot. The method is just that of Tagliani applied to reserve styles by means of padding. It does not always give much difference in shade between the two sides, and the consumption of indigo is considerable.

In the Ribbert process the cotton is prepared with glucose printed with a reserve of copper and lead salts, padded with indigo and caustic soda, steamed for 17 to 20 seconds with a very wet steam free from air, and dyed in the continuous vat. This is the Schlieper and Baum process used with a reserve. Owing to the quantity of indigo fixed by the steaming, the front and back show a greater difference than with the Schaab method. As has been remarked, these processes, while giving a level back, lighter than the face, were principally intended to permit dyeing in the continuous vat. Nevertheless, they require constant watchfulness, and do not always give the same results, so that it is doubtful if they are regularly used even by the patentees.

The following method has been devised. The well-bleached pieces are dyed a light shade in the continuous vat. This finishes them so far as the back is concerned. The face is then printed with a discharge reserve and then padded with Modern Violet. For very fine designs, better results were obtained by padding with the blue first and printing with the reserve afterwards. The discharge used is a chlorate prussiate, as it acts equally on the dyed indigo and the padded blue.

The following is the recipe, which can be varied according to the basis of the continuous vat:

30 lbs. thickening.
10 lbs. Light Modern Violet.
5 lbs. Modern Blue CVI.
3 gal. water.
10 lbs. chromium acetate 24 degrees Be.
15 lbs. tannin (1:1).
15 lbs. Coeruleine printing color.

The recipe for the Coeruleine color is as follows:

94 lbs. Coeruleine powder.
5 lbs. bisulphite of soda.
50 gal. water.
1,050 lbs. thickening.
100 lbs. acetate of chrome, 24 degrees Be.

This color fixes rapidly and reserves with a good white. After seven to eight minutes' steaming, the goods are passed through a bath of bichromate of soda, rinsed and soaped. The results are very fast to rubbing, washing and light, and look exactly as if they had been dyed solely with indigo. The white has naturally not the plasticity of that obtained with lead salt reserves, but, on the other hand, it keeps its white during the finishing operations, which, unfortunately, whites on a ground of indigo do not always do.

The contrast between the two sides of the piece is excellent, and the color is perfectly level on the back—*Revue General des Matieres Colorantes.*

ARTIFICIAL SILK PROCESSES.

BY H. R. CARTER.

In the production of artificial net or lace from cotton cellulose solution, the solution of cotton cellulose is prepared as already described in my series entitled "The Manufacture of Artificial Silk From Cotton," and published in prior issues of COTTON, is being used on the Continent to produce artificial net as used by milliners, etc. The idea was first put into practice by a manufacturer at Lyons, France, and there is now in operation a factory capable of producing nearly 3,000 yards of artificial net per day.

The principles of manufacture rest on the substitution of contiuous moulding for weaving. The process embraces the following phases: (1) The preparation of a concentrated cellulose paste. (2) The moulding of this paste and its subsequent solidification. (3) Finishing the net which includes washing, dyeing, drying and calendering. The present factory uses a process based on the use of a cupro-ammonical solution, which, however, differs from that used for the production of artificial silk, because a maximum of viscosity is required with rapidity of solidification in the mould.

The cellulose paste is forced by compressed air through tubes into a reservoir trough, the sloping bottom of which consists of a steel blade forming a scraper. The circular mould is engraved with a design of the textile to be reproduced, such as net, gauze, lace, embroidery, etc. The cylinder is usually made of glass, ebonite or metal. The engraved cylinder in turning becomes covered with the plastic composition by contact with the reservoir, but only the engraved lines of the cylinder are filled, due to the action of the scraper.

In the case where the cellulose paste, in order to solidify, must be treated with a coagulating bath, the soft moulded material is carried through a bath contained in a trough below the cylinder. Solidification must take place while under the surface of the coagulating liquid. Upon leaving the bath the paste has taken the form of the textile engraved on the cylinder, and the tissue is then advanced by means of rollers to the various finishing processes.

The cylinder has become wet by its contact with the bath, and it is necessary to clean it thoroughly before it again reaches the reservoir of solution. This cleaning process is effected by a special rinsing preparation, and drying apparatus, with the result that the cylinder arrives at the point where the paste is applied, clean and dry, thus assuring the continuity of manufacture. If a nitro-cellulose collodian which solidifies on contact with the air is used, the bath and cleaning mechanism is unnecessary.

The finishing process, as in the manufacture of artificial silk, consists either in removing all copper, desulphurizing the viscose solution of cellulose, or in denitrating the tissue. All this is done in vats containing revolving cylinders. The tissues are sold in widths of 27½ inches for plain net and 41⅓ inches for fancy tulles, etc. The cost is approximately one-half that of similar artificial silk tulle.

WATERPROOFING METHODS.

In waterproofing fabrics with solutions of cellulose in ammonium cuprate, the fabric to be waterproofed is drawn through the copper solution at a carefully regulated speed, so that it becomes partially parchmentized and so that the cellulose in solution has time to deposit in and between the threads. Doctor knives remove the excess of solution and calendering rollers consolidate the remaining mass, while the ammonia is rapidly volatalized by heat or by a current of air. The goods are finally calendered.

Hime precipitates the copper from a solution of ammonium cuprate saturated with cellulose by putting into it strips of zinc and hence obtains a colorless solution of cellulose in ammonium zincate. Into this thick liquid he dips his fabric to be waterproofed so that it becomes well soaked. He then wrings out the excess of solution and drys the goods on a calender.

Fabrics waterproofed with ammonium cuprate show that the pores of the fabric are covered with a skin of cellulose, a superficial combination of the solution with the fabric takes place and the surface of the fabric becomes gelatinized.

A Discharge on Chrome Morant with Stannic Lactate.

A new process in this connection is reported in the Bulletin of the Industrial Society of Mulhause. The fabric is mordanted with chrome in the usual manner and then next imprinted with a suitably thickened solution of stannic lactate of about 20 degrees Be. density, and then steamed, washed and dyed. To improve the white in the case of heavily mordanted goods the addition of citric acid to the discharge paste is beneficial. A report on this process suggests that the discharging reaction is in reality due to lactic acid.

When operating a machine give the work your undivided attention. It may save spoiling a job, if not more serious damage.

The South is the world's greatest cotton field.

FAST COLORS ON COTTON.

BY A. F. MUSGRAVE.

There are several methods of producing colors on cotton fast to light or washing or both. I will here enumerate the methods in use and give a partial list of the dyes best suited for different purposes. The methods by which cotton is dyed may be classified as

Direct.
Direct aftertreated.
Developed.
Sulphur.
Vat.
Analine black.

The direct colors, as a class, have very poor fastness to washing, although individual members have exceptionally good light fastness. The vat colors and aniline black are today considered the fastest colors on cotton both to light and washing. Between these two extremes we have the aftertreated, developed and sulphur colors. Developed colors have a wash fastness nearly as good as the sulphur colors but are deficient in fastness to light. Aftertreated colors rank next in wash fastness to developed colors but in general are superior to light.

The following list of direct colors, without any aftertreatment, give shades of excellent fastness to light.

Naphtamine Yellow B N (Kalle)
Naphtamine Orange 2R. (Kalle)
Naphtamine Fast Red H. (Kalle)
Cotton Yellow G L (Badesche)
Naphtamine Brilliant Blue G. (Kalle)
Naphtamine Brilliant Blue B W. (Kalle)

These products are all dyed in the regular manner except Cotton Yellow G, which is used in combination with Naphtamine Brilliant Blue G to produce bright green shades. It is dyed with 2 per cent phosphate of soda and glauber salts instead of common salt. Wherever possible it is better to use yellow B N as it possesses a much better light fastness.

Naphtamine Yellow B N may be diazotized and developed to a very fast orange. Naphtamine Orange 2R is excellent for union dyeing as it dyes cotton more than wool. Naphtamine Fast Red H is used to a large extent on wool. In some countries it is dyed top chromed on military cloths. The Naphtamine Brilliant Blues have very good fastness to heat and do not redden in artificial light.

The foregoing colors are simply noted for their fastness to light and when it comes to wash fastness another line of colors becomes necessary. The Naphtamine Yellow B N direct is one of the fastest direct colors, but may be aftertreated with chrome, bluestone and acetic in combination with the following colors:

Naphtamine Fast Red H. (Kalle)
Chryramine G & R (Berlin)
Diamine Brown M (Cassella)
Chromanile Black. (Berlin)
Copper Blue B (Elberfeld)

The aftertreatment is carried out with 2 per cent chrome, 2 per cent bluestone and 3 per cent acetic acid at 160 degrees for ½ hour.

Better fastness to washing is obtained with developed colors.

Naphtamine Yellow B N.
Primuline.
Naphtamine Violet B E (Kalle)
Naphtamine Pure Blue 4B. (Kalle)
Diaminogene Blue N A (Cassella)
Diaminogene Blue 13B. (Cassella)
Naphtamine Indigo R. (Kalle)
Naphtamine Fast Green T E (Kalle)
Naphtamine Fast Black K S. (Kalle)

The diazotining is carried out in a cold bath for 20 minutes with 3 per cent nitrite of soda and 5 per cent sulphuric acid, rinsed and developed with the desired developer. The developers in common use are Phenol, B-Naphtol, Resorcine, Meta Toluylene Diamine and phenylene Diamine. Phenol is dissolved in water. B-Naphtol requires one half its weight of caustic soda to get it in solution. Resorcine and the Diamines are dissolved with soda ash.

Care should be taken during the diazotining process that the goods do not come in contact with direct sunlight. Colors in the diazo state are exceedingly sensitive to light and the effect can be readily seen on primuline which, when struck by a ray of sunlight, will not develop in the spot so affected.

Naphtamine Fast Green T E is a very dull green but the range of greens throughout the entire substantive class is very limited. Naphtamine Violet B E, Naphtamine Indigo R, and Diaminogene Blue N A developed with B-Naphtol give dark blues; Naphtamine Indigo R developed with diamine gives a very pleasing shade of black. This black is particularly well adapted for the weaving trade, whereas Naphtamine Fast Black K S is more suited to the hosiery lines.

All developed colors should be given a hot soaping after developing. This removes all loosely adhering dye which otherwise might cause trouble in the finished goods.

For colors possessing very good fastness to washing and light the sulphur colors are recommended. Sulphur colors on account of the harshening action of sulphide of soda hurts the spinning qualities of raw cotton. They are, however, used very extensively, especially blacks. The following list of colors I have found to possess the excellent properties of this class of colors:

Thion Yellow 49. (Kalle)
Thion Brown 0. (Kalle)
Katigen Yellow Browns. (Elberfeld)
Thion Violet 3R. (Kalle)
Thion Direct Blue B. (Kalle)
Thion Green 49. (Kalle)
Thion Black N (Kalle)

There is no sulphur red at present although certain of the vat colors may be dyed from a sulphide bath. Sulphur colors have very poor fastness to chlorine and in this respect have been superseded by the vat colors. The vat colors are the last products in color manufacture and are mainly derivatives of Indigo.

Ciba Colors (Klipstein)
Indanthrene Colors. (Badische)
Thio Indigo Colors. (Kalle)
Algol Colors. (Elberfeld)

These colors all give shades of excellent fastness to all color destroying influences but are prohibited from extensive use by their high cost.

Aniline or Oxidation black is still largely used, especially on hosiery and in the printing trades. Certain of the direct blacks may be aftertreated with the so-called one

bath aniline black. This method yields shades of good fastness but which show a tendency to crock. The process is carried out as follows:

Amount of liquor to be twenty times the weight of stock to be dyed.

5 per cent Aniline salt.
7 per cent Hydrochloric acid.
3 per cent Sulphuric acid.
2½ per cent copper sulphate.
3½ per cent Chrome.

Dye an hour in the cold bath and heat slowly to 160° F. Work ½ hour, rinse and soap. This method may be used to top sulphur blacks as well as direct blacks.

NOTES ON PARANITRANILINE.

This very interesting compound, says Thomas Brocklehurst, in the Textile Colorist, still retains an important place with the printers of cotton goods, for the production of cheap turkey red shades fast to washing, but of inferior fastness to light, most particularly in light shades, which fade very quickly, in comparison with the heavy shades. The greatest drawback in the printing of paranitraniline red is the liability of the thickened diazotised base to froth and decompose, therefore the solution of this problem, that is, to improve the keeping qualities of the printing mixture, has provided the chemist with a field for experiment which has hitherto not been accomplished.

Frieberger who has made many researches on this subject with a view to retaining the bloom of the red, while at the same time increasing the stability of the printing color, mentions the use of strong organic acids or weak inorganic acids instead of acetic acid for the neutralisation of the diazo chloride, and the substitution of derivatives of naphthol such as the 2:1 carboxylic acid of beta naphthol.

After making many experiments I find that in order to get a uniform bright red with a bluish cast the first essential points are that the beta naphthol grounding must contain 5 to 10 per cent of the beta naphthol monosulphonic acid, together with a slight excess of caustic soda over that amount necessary to form the normal naphtholate of soda and an addition of the ammonia-soda soap of castor oil. The depth of the engraving of the printing roller has much to do with the brilliancy of the shade, since when the relative mass of diazo compound is greater in proportion to the naphthol which enters into chemical combination, the result is a bricky red, while on the other hand a slight excess of naphthol does no harm, hence it is advisable to regulate these proportions, either by reducing the diazo printing paste with more thickening, or strengthening the naphthol ground correspondingly.

Of the different acids I have tried, to replace acetic acid as a neutralising agent, phosphoric acid in the form of disodium phosphate gave results similar to acetic acid with the stability little or no better. Oxalic acid gave a yellowish red, which keeps better than acetic acid. Tartaric acid, as rochelle salt, gave a very nice shade, but contrary to expectation the diazo tartrate decomposed very easily, in fact much more quickly than acetate. I also tried a combination of rochelle salt and acetate of soda, using just sufficient acetate to neutralize the free acid, then adding the required amount of rochelle salt to change the diazo chloride to tartrate, and with another sample just half this latter quantity, thus leaving the diazo body partly as chloride and tartrate, but even these did not keep so well as the one made with acetate of soda.

Therefore there does not seem to be any advantage to be gained by the use of these other organic or inorganic acids, since with the exception of phosphate of soda the price will be higher, and the acetate of soda gave more depth and bloom. For very bluish cast reds, I find that by the use of acetate of alumina, (red liquor) acetate of lime, or even tartrate of alumina for neutralizing the free acid and diazo chloride, excellent results are obtained from a shade point of view and if steaming be necessary such as is the case when basic or chrome colors are printed in conjunction, the red shades are faster and will be found more useful, since, when the alumina salts are used, a little rhodamine can be introduced after dissolving in acetic acid to render the shade still bluer.

Prof. Witt has recently found that the diazo chloride of P. nitroaniline reacts with two molecules of beta naphthol sulphonic acid, which after neutralizing with soda, yields a stable double salt, which can be coupled with naphtholate of soda, but which however gives yellow shades of red. This body may possibly prove of interest as a stable developer for direct dyes, in the place of paranitraniline straight, but even this is doubtful since the resulting shades are not so pure and its higher price will exceed any advantages it may have. Other sulphonated naphthalene derivatives have the property of retarding the decomposition of the diazo compound, and doubtless exert a similar action, namely form a stable double salt, of which may be mentioned para durole (Bayer & Co.) which has met with success in this direction. The shades vary but little from the original since only two-thirds of an ounce of para durole per gallon of printing paste is used, this being added direct, just before printing, along with the sodium acetate. If the addition of para durole be made in conjunction with acetate, or tartrate of aluminum or acetate of lime, in equivalent proportion to the sodium acetate, fine shades can be obtained which also keep well. The further addition of a little free acetic acid is also an aid in this direction.

The solution of diazotised paranitraniline has long been used as an after-treatment of direct dyes which contain an (OH) or (NH_2) group as end conponents in certain positions, by which means a condensation or coupling takes place in the molecule, similar to that with naphthol in the case of para red and by this means the fastness to washing is greatly increased. There is but little need of preserving substances in the coupling bath since the whole operation only takes at most 20 minutes, and the stock solution if properly made will keep several days in the form of chloride. It might be mentioned here that this solution is best stored in covered casks, with an outlet about six inches from the bottom, from which the clear liquor can be drawn, and any sediment or insoluble particles either float on the surface or settle down to the bottom. Notwithstanding the ready manner in which paranitraniline is diazotized and can be kept, many dyers prefer to use the already diazotised product sold in the powder form under the names of Nitrazol C or Parazol FB of which 5½ parts are equal to one part of the paranitraniline base, and it is necessary to grind to a paste with water then dissolve in more water, filter, neutralize the free acid with soda ash and acetate of soda before adding to the bath.

The after-treatment with paranitraniline greatly increases the fastness to washing, but even as para red is

fugitive to light so are the aftertreated dyeings much inferior in this respect. With the object of improving the fastness to light I have found that the dyeings can be made considerably faster by introducing metallic salts into the coupling bath which enter into chemical combination in the cold, which in the case of green, olive drab, brown and black shades, produce little or no alternation in shade, while yellow and red shades are rendered slightly duller. At the same time the fastness to washing is better than ordinary. The method consists in adding copper acetate made directly in the bath by equal parts of copper sulphate (bluestone) and acetate of soda, with or without the addition of bichrome and acetic acid. For instance, in the coupling of a direct black:

2	per cent	paranitraniline base are diazotised with
5	"	muriatic acid 32° Tw.
1⅛	"	nitrate of soda. Then before entering the goods add
10	"	acetate of soda crystals
2	"	acetic acid, 30 per cent.
5	"	copper sulphate (bluestone)
2	"	bichrome,

in which the goods are worked 20 minutes in the cold, then rinsed, soaped and washed. This represents a relatively large quantity of copper, but on a black is not too much, but in the case of either shade can be reduced correspondingly according to the brightness of the desired shade. The copper is rapidly taken up in the cold, as is also the chrome, equalizing very well and even preserves the diazo compound, so that no harm is caused by a slight rise in temperature, as is often the case in summer time. Many direct blacks on treatment with bluestone, chrome and acetic acid at high temperatures, turn from dull violet to brown shades, of good fastness to light, but by employing this method more than the equivalent amount of copper is absorbed, yet with a decidedly deeper black, faster to washing and good to light. On cotton piece goods the good effect of the process will be found valuable for fast shades with direct deep black E Extra and RW Extra, which discharge a pure white with Rongalite C and also with the Para Blacks R and O Extra conc. On the other hand Columbia Black B when after-treated with paranitraniline alone gives but a brown, while if 3 per cent of copper salt be added a good black is obtained.

Para Scarlet G Extra turns duller and bluer in proportion to the amount of copper used;

Para Yellow R goes greener and duller;

Para Green G is slightly bluer and a trifle duller;

Chrysamin G, much greener and duller.

Benzo Brown R Extra, Pluto Brown, Pluto Orange G when treated with the copper combination, are left practically unchanged from the regular coupled shade, as are also Zambesi Black BR and D, Chromanil Brown R, Para Blue B and R.

In almost every case it was found that when bichrome was used in combination with copper sulphate and sodium acetate, the resulting shades are brighter and a trifle faster to washing than when using the straight copper salt. It is believed that this method can be utilized to great advantage after a proper selection of dyestuffs has been made.

When in doubt concerning your work or the operation of any machine, ask your foreman.

MERCERIZING COTTON CLOTH.

BY RAFFAELE SANSONE.

PART ONE.

Although mercerization represents at present one of the most important operations to which cotton goods are subjected, from the boiling out process to the finishing that terminates the greater portion of spun or woven articles, its introduction and application in practice has only really taken place during the last eighteen years. During this period it has been subjected to so many transformations and improvements, and the once expensive and unpracticable treatment of the goods, carried out on the first apparatus, is scarcely to be recognized when considered side by side with a modern mercerizing plant, where it has been brought to such perfection that it can be used to advantage for the production of the cheapest articles.

The process of mercerization owes its name to John Mercer, a Lancashire calico printer, who is said to have discovered in the year 1844 the shrinking action of strong caustic soda on cotton. His discovery, coming in a period of general awakening in all industries, aroused a great deal of interest. Unfortunately it could not be employed at the time for any purpose in practice, but later it found some application in the manufacture of cotton blankets. This was however, nothing in comparison with what was to follow when in 1890, forty-six years later, the Englishman Lowe patented an invention based on the stretching of the material treated by Mercer's process, and which permitted the production of a bright shine or lustre. His discovery does not seem to have brought to anything useful till five years later, when it was taken up by two Germans of Crefeld who essayed to treat cotton yarn on a certain scale with the new process. As the first experiments brought very promising results, they continued with their trials and could soon manufacture a certain number of yarns of great lustre and brilliance, which, owing to their novelty soon found a ready sale despite the excessive cost of their treatment.

One of the first appliances for mercerizing cotton yarn consisted of two thin, but sufficiently strong arms of wood or iron on which the hanks were placed and stretched by means of a screw arrangement. When mercerizing, the whole apparatus was lowered into a wooden vat, containing the strong caustic soda lye.

This simple means of treating yarn has been since much utilized and the machines now in use, although much more rapid and convenient in their working, are still based on the same principle, of impregnating the skeins in a stretched condition.

The great encouargement given by yarn mercerizing was to have its application also in the treatment of piece goods. The mercerizing of piece goods was a much more difficult question to solve than had been that of yarn, and it took some time and much experimenting before anything really promising was obtained. The period of success was, however, to follow when the first machines for treating the material under tension made their appearance in the dyehouse or bleachworks, where the trials were initiated. In some of these the cloth was passed through the caustic soda lye contained in an iron trough of a modified padding machine, in such a way that it was always kept stretched on the borders by means of pins or points

contained on guide rollers. After the treatment with alkali the material was squeezed between rollers, and passed onto the stretching part of the machine, where it was brought to the desired width and then washed with water to remove all the caustic soda.

This method of mercerizing piece goods was substituted later by machines of more simple construction and more effective action, in which only one stretching of the material took place without the employment of points, which were substituted by clips; these machines can be considered as the foundation of the present machines which are constructed on the same principle.

Until about eight or ten years ago mercerization was only applied for the production of the finest goods, the principal scope being to obtain, by the employment of the best long stapled cottons (Sea Island and Makho), as fine a lustre as possible. This is not always the case in our present times, and many goods constituted of very inferior cottons, such as short staple cottons, indian cottons, etc., are all subjected the same to the mercerizing process, as the small expense, when carried out under convenient conditions, is fully compensated for by the increased affinity of the material for the dyestuffs, which permit dyeing with a much reduced quantity of salt, than if ordinary boiled out goods had been used. This application is of the greatest importance in the dyehouse, and permits with many colors, by dyeing in a continuous bath, or on the jigger, as the case may be, a simplification of the older methods. In fact, by its means many dyers already talk of doing away altogether with salt or glaubersalt, using these latter only when it is necessary to completely exhaust the baths.

A similar simplification converts the process of dyeing under more and more mathematical conditions, and in the near future it will be possible by the employment of special apparatus, to conduct the manufacture of colored goods in a still more continuous manner than is at present in use, employing dye liquors of standard strengths and dyeing only one shade and color per unit. Such a disposition will then permit a much larger production than is at present possible, reducing further the price of all classes of dyed material. It is quite possible of there being required only those coloring matters that can dye in a very concentrated solution, giving shades of sufficient intensity.

In the older dyeing process, still largely used at present, the salt is added in order to precipitate on the fibre the coloring matter, which is deposited in a more or less superficial condition. If, however, the salt is left out altogether, the coloring matter is taken up to a certain extent mechanically on the fibre, only in this case, it penetrates better into the inner pores or cells, producing more level dyeings than in the first instance. The quantity of dyestuff absorbed in this manner was not sufficient for producing the majority of shades, and until means was found for increasing its affinity for the fibre, salt additions had to be resorted to. If the material is, however, previously steeped in a caustic soda bath of convenient concentration the penetration of the dyestuff is more thorough, and it is possible to produce much darker shades.

By studying the most convenient dyestuffs the intensity of the shade can be brought to any required strength, and the majority of the articles on the market closely imitated. The fastness of the colors should be somewhat superior to those where ordinary cotton has been used or salt has been added to better exhaust the baths. The question has not been investigated so far, but in the near future, when the new ideas of dyeing have made more headway amongst the conservative people of the dyehouse, it will receive the necessary consideration. There is also a certain saving in the amount of dyestuff used, and it is maintained by some that it may amount, for very dark shades, to as much as 30 to 40 per cent.

This new application of mercerization as a means of economizing salt and dyestuff in the dyehouse brings us to another question, which to the writer's knowledge seems still to be solved. This is the most convenient strength of caustic soda to be used.

With materials treated for luster, the temperature plays an important part in the strength of the caustic soda lye to be used, for, taken naturally between certain limits, the lower the temperature the weaker the lye may be. Thus a lye of 30 degrees centigrade, measuring 35 degrees Baume, gives a more or less equal effect as one of 25 degrees Baume, but in which the temperature does not exceed 18 degrees centigrade. Below zero degrees centigrade the temperature has no longer effect on the mercerizing properties of the lye. For this reason, when the most favorable conditions are used, the lowering of the temperature can give advantages in mercerizing, while it permits a certain economy in caustic soda. The bringing of the lye to the lower temperature requires a corresponding cooling, and it is this cooling that prevents the method in many cases. Firms having a very large quantity of material to mercerize at a time have a double walled lye impregnation tank, and iced water circulates between the walls. Others prefer to cool the lye in a special cooling tank which is surrounded by cold water in which lumps of ice, manufactured by the calcium chloride process, are thrown in. The installation and maintenance of similar plants are, however, so expensive that many firms prefer to do their mercerizing at higher temperatures with stronger lyes.

When mercerizing is done on a very large scale the cooling of the lye is indispensable for rational working, for not only is the luster thereby increased and the number of border breakages diminished, but a saving is effected, as the lye can be used seven or eight degrees weaker.

With mercerizing undertaken for increasing the affinity of the fiber for dyestuffs it is not yet really known if it is necessary to use a caustic lye of the strength as employed for the mercerizing process for producing luster, or if a weaker lye under other conditions would give better results. It can well be imagined what benefit it would bring if certain goods had only to be treated with a lye of less strength than 30 or 35 degrees Baume, say with one of, for instance, only 20 degrees Baume or less. With many materials overloaded with size, where the only aim is to increase their affinity for dyestuffs still keeping in as much as possible of their size, a weaker lye would undoubtedly go much further in reducing its extracting; thus permitting a great reduction in the loss of weight, and preventing in many cases, any following sizing, besides avoiding, to a certain extent, the entrance in the washings of the mercerization of soluble impurities such as size, coloring matter, etc.

This property of mercerized goods for absorbing coloring matters has been studied by many scientists, and from their observations much valuable information may be gathered. Thus the action of a beta-naphthol solution on mercerized and unmercerized cotton was observed by W. Schaposnikoff and Minaieff, who found that although mercerized cotton takes up nearly the same amount as unmer-

cerized material, the following treatment in Diazotized Paranitraniline gave with the first much darker shades than with the second. An Immedial blue solution was next tried by the same investigators, and the treated cotton was found to take up as much as 40 per cent more dyestuff than ordinary untreated material. With aniline black, however, the case was found to be quite the inverse, for when both cottons were dyed in this black by the ordinary processes the mercerized cotton was found to absorb much less of the colored lake than the unmercerized. This latter instance is very important for aniline black dyers, many of whom prefer to dye goods that have not been mercerized, for they find that they take up more easily the black, or emeraldine lake.

By studying the different fibers under a microscope of great strength it was found that the mercerized material no longer contains the cuticle, which can be seen on unmercerized cotton, and as this resists generally the action of the coloring matters, it is easily explained how the first takes up solutions better than the second.

Another observation of some importance to dyers was made when dyeing mercerized cotton in the wet state directly after mercerization, and on wetted material, also mercerized, that had been dried after this treatment. It was found that by dyeing directly after mercerizing, without any previous drying, the material took up a certain percentage more of dyestuff, than if it had been dried and aged and again wetted out. This is very important for it confirms the advantage of carrying out the dyeing directly after mercerizing, without necessitating any drying.

Mercerized cotton certainly exhibits a very marked difference, and if examined by any of the following tests, it can be easily gathered that the real reaction that takes place in mercerizing must invariably be of a physico-chemical character.

Mercerized cotton exhibits a very marked difference from ordinary unmercerized material. If again considered under a microscope of some strength the treated material appears to have lost, besides the cuticle already mentioned, its characteristic cork-screw appearance, while a central canal runs all through.

This physical difference between the ordinary and treated fibers is not however sufficient to prove mercerization as only being due to a physical change, for the latter also offers a certain number of characteristic reactions which are not possible with ordinary cotton, and which prove that the treated material must be somewhat differently constituted than the untreated.

Some of these reactions are very marked, and are used for the detection of mercerized cotton. Before undertaking any of them it is necessary that the material be of a pure white color and free of any agent that would give the same reaction as mercerized cotton, such as starch, etc. As the majority of the goods on the market contain this substance the wisest plan is to boil any sample that it is wished to test with a little malt extract, and when all size has been extracted, if the sample is not white, subject it to another boiling, but this time with a little hydrosulphite solution. Should no perfect white then be produced after about one-quarter of an hour boiling, the sample should be well washed and placed in a fresh test tube where it is boiled with a small quantity of weak sodium hypochlorite solution till the desired white has been produced. After either of these boiings the material is treated for some time in a weak acid bath, then well rinsed until the last traces of acid have been expelled, and dried between two sheets of filter paper. It is now ready to be treated.

One of the tests generally recommended is carried out with the following solution:

30 parts of pure zinc chloride and
6 parts of potassium idoide are dissolved in
14 parts of water, and to the resulting solution is added
1 part of powdered iodine.

The solution must be well shaken before use and kept in a properly stoppered glass bottle. It should be allowed to stand overnight, in which time a certain quantity of sediment separates out. The clear only must be employed for the trial.

The samples to be examined are placed on clean watch glasses, and a little of the solution is added by means of a glass rod till they have been thoroughly soaked. These are now covered and observed.

After a few seconds, both samples become of a dark bluish black color and no difference can be seen between them. If, however, each watch glass is filled with exactly the same quantity of water, without leaving any interval between the addition of the water in each case, a change is soon noticed, for the material becomes lighter, changing into a distinct blue. In the case of mercerized cotton this blue persists and cannot be washed out, while in that of the unmercerized it becomes first violet, then reddish, and finally disappears completely.

Another test, which is of much simpler application, consists in steeping the sample in a solution made up by dissolving 20 grams of iodine in 100 grams of a saturated potassium iodine solution in water, then washing repeatedly in water. If the sample remains blue it has been mercerized, while if it is diecolorized, the cotton can be considered as unmercerized.

A reagent made up with 45 parts of sulphuric acid sp. gr. 1.84 and 55 parts of water with a trace of iodine solution in potassium iodine gives a characteristic reaction with mercerized goods.

As will be seen from these reactions something different must be present in the mercerized cotton for reacting with the iodine, that is not present in ordinary cotton.

For these reasons mercerization must be divided into two distinct classes, one for producing the finest shiny goods, imitating closely many of the most appreciated silk articles, and the other destined simply to impart to the material a greater affinity for dyestuffs, avoiding in many cases the boiling out operations.

(To be continued.)

Effects of Steaming on the Affinity of Cotton for Dyestuffs.

It has been found that a high temperature or steaming changes the physical properties of cotton in a manner which is the reverse of that of mercerizing; that is to say, the fiber becomes less able to absorb dyestuffs after steaming. Even the increased affinity of mercerized cotton towards dyestuffs is lessened under these conditions, although the luster of the fiber is not changed by the steaming.

Adjustments and oiling should be avoided when a machine is running.

Practical Problems Discussed by Cotton's Readers

We invite our readers to make use of this department for the discussion of any and all problems arising in the mill or the finishing plant. Questions, answers or letters need not conform to any particular style and will be properly edited before publishing. The editors do not hold themselves responsible for any statements of opinion or fact which may appear in this department unless so indorsed. This department is open to all. Suitable letters are paid for in cash.

THAT QUESTION OF CUT WASTE.

EDITOR COTTON:

Although I have worked in different mills, I have never been at any place where the knife was used to cut the last half layer of roving off the bobbins in the card room. If this was allowed, it would not be a case of how much was on the bobbin, but how sharp the knife happened to be, as it would be an easy matter to cut even two or three layers off with one stroke. It would also cut the fibers of the cotton, and the bobbins would soon be cut to pieces, and the renewal of them would be an expensive item. Where I am working there are bobbins that have been in constant use for eleven years and show little sign of wear.

Some carders have the small pieces scraped off with card-clothing fastened on a block of wood, and in other mills these are stripped off by a twist of the hand, where there are no shoulders on the small end of the bobbins. But neither cutting nor scraping is necessary. The proper way to take out the bobbin when creeling is with the left hand, and give a few quick turns with the right; then take the end of the roving and piece it to the full bobbin, first breaking two or three inches off the end strand of the full bobbin, as it is apt to be a little soft. The short strand broken off must be thrown on the shoulder or put in the waste pocket, as nothing looks worse on the floor than the white waste.

Sometimes a tender will break off the roving and wind the rest from the bobbin while it is still in the creel, which is very bad practice, as it makes lots of waste. The tenders are also liable to make long overlaps in piecing, or the end will sometimes run through, causing single. The manner of creeling is very important, and this is often left to take care of itself. If left alone, the help will put the bobbins in as quickly as possible so as to have a longer time elapse before having to creel again. If one row is put in right after another, there are more piecings in one set of roving, and if for various reasons a set was made a little larger or smaller, it would cause two rows to come out together, which would make trouble.

My idea of how to creel is as follows: Have the front row come out first. This is easy to watch, as the tender is in front of the machine and can see if any ends break, etc. Then, when about one-third has run off, have one of the three back rows creeled; the remainder when the front row has two-thirds run off. By doing this way the girl will not have to run back and forth all the length of the machine, only just about one-half, and it is easier to see if any ends are down in front. If carders will try this system, I am sure they will never go back to the old way.

After all is done, there are always some of the help who make more waste than others. Weighing the waste for each pair of frames every day is a good plan, as it is no more trouble to have this attended to than to let it all go into one basket, which would have to be a big one and emptied often, and it does not do any good to weigh it after it has been mixed up. In regard to working up the waste, which will not be much if this system is adopted, I agree with "Wash" that a waste machine is not required except to take out the threads from spinners' clearer laps. Running waste through a waste machine is too severe treatment, and it is most always taken from the machine and put in the mixings, thus having to go through all the beaters again. This is too much, but as long as it has to be used over, a good way is to put two breaker laps on the intermediate picker and feed the waste through on top of it, so that you get a 50 per cent waste lap to put with three good ones in the finisher picker. If possible, run one at a time in the card room, and with the doublings it receives it will almost lose itself, and the troubles with the waste evil will come to an end.

Never let up until you are sure no waste is being made that can possibly be helped. The way to keep the room can be better illustrated by the following story, which may or may not be true:

The carder was standing on the stairway just outside of his room when the manager came along with a small handful of waste he had picked up on his rounds. "Say," said the manager, "how is it I keep finding waste around here?" "That isn't my waste," said the carder. "How do you know it isn't yours?" asked the manager. "Well," said the carder, "if it was waste from my room I would have missed it."

Lanes (Michigan).

MORE ABOUT CUT WASTE.

EDITOR COTTON:

In looking over the July issue an article came to my notice by "Lewis" on cutting roving and yarn off bobbins. He tells us this is something that should be kept down as low as possible. It is surprising to me that an evil of this kind should be allowed to exist in any room. There is no excuse for cutting in any room. It is a matter of gross incompetency of the foreman to allow any cutting in any shape or form, and shows a lack of judgment in systematizing his room.

If this evil has gotten into a room, it is a very simple matter to stop it, and that is to have a system in the room that will prevent such a condition. It will generally be found that where this cutting is allowed the mill is run slack from the superintendent down, and the sooner the stockholders get competent men the better it will be for their interests. This cutting comes under the head of good managing, and a well-run mill would not allow it to exist for a minute. Have your room put in good running shape; do not trouble yourself with what your neighbor is doing. "Men who live in glass houses should not throw stones." This is a world of progress. It is not what you have done; it is what you are doing at the present time. Do not wait for the superintendent to call your attention to these evils; you should know as much as he does about the room, if not

more. There are men at the present time trying to run their rooms with all the physical strength they have. They will come in in the morning, roll up their sleeves, take off their collar if they have one, and start in whooping and whistling from one end of the room to the other; piece up an end here and there, and trying hard to do all the work themselves. If they would look at the doffers piecing, they would probably find them lapping the end on the bobbins. It will run bad in the spooling, and the girl will commence to cut so she can get her work up for the next doff.

I do not blame the girl for this. She's got to make a living by her work. But I do blame the overseer; he alone is responsible for every cut bobbin in his room. He should use a little common sense and get a system established of which he would not be ashamed. Now, in the managing of a room you have not got to be a preacher. Do not think you are so much better than those you have working for you. Stop and consider whether it might not be possible for some of your help to have as much ability and just as good blood as you yourself possess. Then do not go around with a bulldog face on and bark at everybody you come in contact with, but just keep yourself neat and respectable in dress and principles, and you will win the confidence and respect and good will that will make things work easier and better, and the improvement will be greatly appreciated.

I am just expressing my thoughts on this matter, and charging cut yarn to bad management and the lack of good sense.

In closing I would touch a little on the dipping matter recommended by "Lewis." I consider this is mighty poor advice for a practical mill man to give at the present time, when the price of cotton and the condition of the mill business are taken into consideration. It would certainly be rather expensive for a mill of 40,000 or 50,000 spindles to equip with basin and then pay water tax for the negligence of the management of the room.

Now, just one more. Will "Wash" please state the percentage of waste of production before and after he stopped the waste machine? Also, what he calls waste in a cotton mill? X. Y. Z. A. (Mich.).

WANTS A RECEIPT FOR SIZE.

EDITOR COTTON:

It was with much interest I read "Mack's" article in the June issue of COTTON. Now, "Mack," why not give the readers of this department a good sizing recipe for coarse, medium and fine yarns? I am sure that such a recipe would prove of great interest to the readers.

As I have stated before, my only aim in contributing to this department is to convey as much as possible my practical experience to others and get the experience of others in return. Wash (Mass.).

A brief account of the new type of cotton grown in Egypt, called the Pangalo, appeared in Daily Consular and Trade Reports for March 5, 1914. Consul General Olney Arnold now sends from Cairo samples of ginned Pangalo cotton, which he received from the Egyptian Ministry of Agriculture. These samples will be distributed, as long as the supply lasts, to firms addressing the Bureau of Foreign and Domestic Commerce.

PROGRESSIVE FLAT SETTING.

EDITOR COTTON:

"Williams (Mass.)" seems to think that he has made a discovery in regard to the setting of flats on the revolving flat card. I do not wish to set my judgment against men that have been in the mill for thirty or more years; neither do I wish to be a "know-all," but I do say that "Williams" was somewhat mistaken when he made the statement in the June issue that there can be but little agreement in favor of progressive settings. I do not know where the idea of progressive flat setting came from, but I have an idea that the practice of so setting started from some man experimenting with different settings rather than borrowing the idea from the worsted carder. "Williams" called our attention to the fact that the flats are always in motion, and argues that if the flats are set farther off at back than at front, the carding surface is reduced. Perhaps he is right on this point, but he seems to forget that the flats have another duty to perform besides combing the fibers out straight—i. e., taking out short fibers or other impurities.

Let him make this experiment: Set his flats to a 10 gage all the way around and run the card several hours. Now stop the card, raise the setting stands until there is no danger of the flats taking any stock from the cylinder, then turn the flats around until all working flats are on top. By so doing he will find that the back flats as well as the front ones are filled with short fibers and other impurities. If he is using very dirty stock, the flats will be entirely filled with short fibers, many of them being pushed down to the foundation of the teeth on the front flats. On the surface of the flats will be found many long fibers, but very few of these long fibers will be found embedded between the teeth, but will be found hanging loosely to the carding points.

Now let him use the progressive settings and make the same experiment, and he will find that there is as many of the long fibers hanging to the carding points as before, but that instead of the short fibers being imbedded between the teeth, they are near the top of carding points and easily carded off by the stripper comb.

My argument is that if the flats are all set to the same gage, the back flats are the first to catch the short fibers, and as the flat moves along the surface of the cylinder, these short fibers are pushed farther and farther toward the foundation of the teeth until, by the time the flat leaves the cylinder, many of them are so firmly embedded between the teeth that the stripping comb cannot remove them from the flats. I believe this is to be one of the causes of so many of our mills being troubled with dirty flats, whereas, if they would use the progressive system of setting, they would get the same amount of combing and cleaning with a flat that will stay clean, for by having the front flats set to catch the most of the short fibers, the carding action of the long fibers being pulled between the teeth will not have as great a chance to force them down to the foundation of the fillet. With very dirty stock, and using the same settings for all the flats, another evil arises. That is, the back flats become so fully charged with short fibers that no carding action can take place after they have moved a short distance from the back, and the stock is rolled between flats and cylinder, and naps are produced by this rolling action.

I have had considerable experience as grinder on differ-

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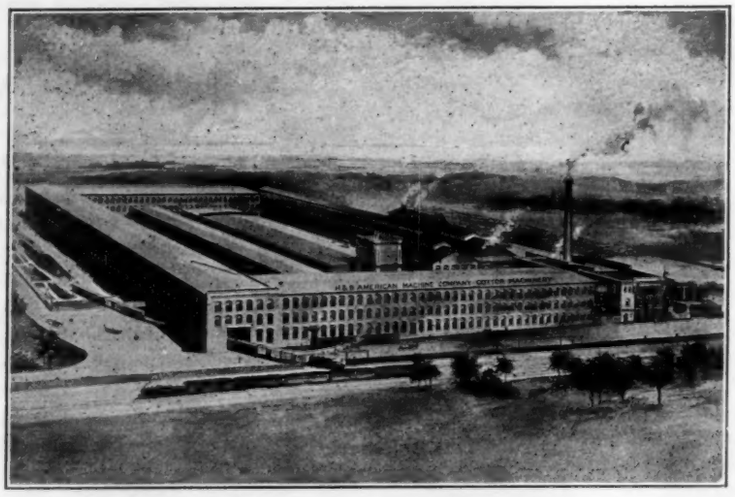
COTTON MACHINERY

Opening and Picking Machinery

Card Room Machinery



Spinning Room Machinery

Twisters for Wet or Dry Work

With Band or Tape Drive

H. & B. AMERICAN MACHINE COMPANY

PAWTUCKET, R. I.

ent grades of staple cotton, from good middling grades to ordinary, and have done much experimenting in regard to getting the best work possible from cards, and will add here for "Williams'" benefit that in using progressive setting I generally use a 10, 9 and 7 gage, although not in all cases.

Practical (North Carolina).

An American consul reports that a firm in his district desires to be put in touch with American manufacturers of men's fleece-lined cotton underwear, and requests that cash prices be quoted c. i. f. Liverpool. This is said to be one of the largest wholesale houses in this line in the country in question. For further information write the Bureau of Foreign and Domestic Commerce and refer to file No. 13064.

TESTING FINISHING MATERIALS.

EDITOR COTTON:

One of the little, yet really important things that often come up in the experience of a finishing room overseer is to test out some new kind of sizing or finishing material. The job is very often done in a perfunctory way and is also very often approved or condemned, according to the prejudice of the overseer. Some overseers with unbiased minds really give the materials an honest test, but they are lacking in knowledge as to what constitutes a fair test. It is my purpose in this letter to present what I consider a fair test of material of this character.

Before going further let me say there is one class to which this does not apply, viz., those materials intended to improve the appearance of the goods. For the testing of this class the eye and the experience of the man in charge must alone be depended upon, but if it is a material calculated to add or subtract weight, then a more thorough test is necessary.

Before comparing anything we must first have a standard up to which it must measure or fall short. As there is no standard of sizing formulas, but as nearly every mill or overseer uses his own formula to accomplish a given end, we will consider the formula that he is using as the standard to which the new material must compare. But before he can compare what the new material to be tested will do, he must first know to a certainty what his old material is doing. To accomplish this a test roll, finished with the old materials is put through. Then a roll finished with the new materials is processed in exactly the same manner. For this purpose I always yard these rolls both before and after finishing, for as I see it, a very little difference in the lineal stretch will alter the results to a very appreciable extent. I give in detail the process I follow.

Suppose we are invited to try a certain brand of starch in place of that we have formerly used. Without giving any real names we will call the starch we have been using "Standard" and the one we are to test we will call "Perfection." We can buy standard starch at 3 cents per pound, but "Perfection" will cost 3½ cents, yet the manufacturers claim that "Perfection will load our goods, and show it less so much so that it will prove profitable to substitute "Perfection" for "Standard." We want to know if their claim will stand so we test it to see.

Yarding a roll of our goods by old formula both before and after finishing we find it lines up as follows:

After finishing 420 lbs. 2125 yds. 5.06 ave. weight.
Before finishing 395 lbs. 2074 yds. 5.25 ave. weight.

Gain 25 " 51 "

6.33 per cent gain in weight, 2.46 per cent gain in stretch. Excess gain in weight over gain in stretch, 3.87 per cent, or enough to reduce our average weight 4 per cent from 5.25 to 5.06.

Now having a standard we proceed to try out our "Perfection" starch in the same manner. We yard a roll of the same class of good and run it through a size made by exactly the same formula, save we substitute "Perfection" for "Standard" starch. We find this lines up as follows:

Before finishing 430 pounds 2,164 yards 5.03 average weight.

After finishing 400 pounds 2,121 yards 5.30 average weight.

Gain, 30 pounds, 43 yards; 7.50 per cent gain in weight, 2.02 per cent gain in stretch. Excess gain in weight over gain in stretch, 5.48, or enough to reduce our average weight from 5.30 to 5.03.

From this test it would look as if the "Perfection" was decidedly the best to use; but there is another element yet that we must consider, *viz.*, a matter of cost. In this case we would have only to figure the difference of ½ cent per pound on the given pounds used, say 100 pounds; this shows an excess cost off hand of 50 cents against "Perfection" starch, but we must also consider that more pounds of starch went through on our goods, and therefore our tank of size will not do as many yards as by the old formula.

If we would know our exact savings by using this starch, we would figure that the excess or net gain of weight less the stretch of one over the other was as follows: 5.48 per cent — 3.87 per cent = 1.61 per cent. So if we could, by spending ½ cent more for starch, save 1.61 per cent of cotton, we would only have to know how many yards less this new starch would size. To illustrate, if "Perfection" starch would size only 2,000 pounds of goods, whereas "Standard" sized 2,500 pounds, then we would figure that 2,000 pounds is about 8 per cent less than 2,500. So we would have to add not only 50 cents, but also 8 per cent of the cost of our standard formula, which, we will say, cost us $4.00 for all the material used. Our figures would therefore be $4.00 × .50 × 8 per cent of $4.00, or .32 = $4.82, or an excess cost of .82 cents for 2,000 pounds of goods. We found our net gain to be 1.61 per cent. Then 1.61 of 2,000 pounds = 32 pounds of stock. This extra .82 cents would enable us to save, conceding our cotton cost 12 cents, 12 × 32 = $3.84 less the extra .82 cents shows a saving of $3.02 on each 2,000 pounds of goods in favor of the "Perfection" starch. Finisher. (Miss.)

FLYER-LEAD VS. BOBBIN-LEAD.

EDITOR COTTON:

There is an old saying that "what everybody says is so must be so," but this is knocked out when the arguments for and against the flyer-lead frame are considered.

I have visited many mills, North and South, and have found only 17 carders and 3 superintendents in favor of the flyer-lead frame.

Every man against the flyer-lead frame will tell you that the defect is there, but at the same time are unable to give the reason. Now, I will give any reader of COTTON a $5.00 check if he can describe how any hesitation of the bottomcone will strain the roving. I am doing this for the good of the industry, and I am so sure of my judgment that I am willing to take the chance. The following may help the reader win the five:

In the flyer-lead frame, when you decrease the speed of the bottom cone, you increase the speed of the bobbin. When the bottom cone is stopped, the speed of the bobbin is increased to that of the spindle or flyer. In order to strain the roving, the bobbin must lag behind the speed of the flyer. The only way this is possible is by shifting the rack back toward the starting point, or by having a rack gear on the frame that does not move the rack enough at every completion of the traverse or carriage.

I want to go on record as saying that when the change in the system was made from flyer-lead to bobbin-lead, a great mistake was made, when the loss of efficiency is considered.

No one can argue but what the bottom cones take revolutions from the bobbin. So, then, in the case of the flyer-

What kind of articles would you like to see in COTTON?

Which departments interest you most?

.....

.....

.....

Name.....

Address.....

Position .....

CUT OUT, FILL IN AND RETURN THIS BLANK.

Notice. **Because of the time necessary to collect data, or locate some person peculiarly fitted to write on a subject, applicants must not expect to see subjects suggested appear in the next issue. They will, however, appear in due time.**

Barrett Specification Roofs

A Barrett Specification Roof was put on this building because—

The architect knew all about the different types of roofing and further knew that the National Biscuit Company were mighty particular people.

They had a big plant and they wanted it covered with a roofing that would give **long service at a low cost.**

Under such conditions the architect knew there was only one choice, namely: a Barrett Specification Roof, because it gives longer service at a lower **unit cost** (the cost per square foot per year of service) than any other roofing he could specify.

This building is now covered with a Barrett Specification Roof and it will probably last twenty years or more with **no maintenance cost.** Many such roofs have lasted thirty years.

Every permanent building, whether large or small, should carry a Barrett Specification Roof because that means the most economical roof, and one that will be free from leaks and maintenance.

Ask any first-class architect regarding this proposition and he will verify all of the foregoing statements.

HYDRONON
The Damp-proofing Paint.
Especially recommended for use above the ground level on the interior of stone, brick or concrete walls to exclude dampness.
Has wonderful covering capacity and is vastly superior to other paints in its permanence and resistance to dampness. Furnishes satisfactory base for plaster and keeps the plaster from injury by dampness in the wall.

Booklet Free

TAR-ROK SUB FLOORS
They cost less than piers and heavy timbers and extra excavation necessary to provide required air space beneath. They provide for absolute rigidity. No vibration is possible, regardless of character of machinery.

Booklet Free

Owner, National Biscuit Co., New York City
Architect, A. G. Zimmerman, New York City.

Gen. Contr., Cauldwell-Wingate Co., N. Y.
Roofing Contr., Tuttle Roofing Co., N. Y.
Waterproofing Contr., Germania Roofing Co., N. Y.

Photo. Copyright I. Underhill, N. Y.

A copy of The Barrett Specification with roofing diagrams mailed free on request.

Special Notice

We advise incorporating in plans the full wording of The Barrett Specification, in order to avoid any misunderstanding.

If any abbreviated form is desired, however, the following is suggested:

ROOFING—Shall be a Barrett Specification Roof laid as directed in printed Specification, revised August 15, 1911, using the materials specified and subject to the inspection requirement.

TRADE B MARK

BARRETT MANUFACTURING COMPANY

New York Chicago Philadelphia Boston St. Louis Cleveland Cincinnati
Pittsburgh Birmingham Kansas City Minneapolis Seattle
THE PATERSON M'F'G. Co., Limited: Montreal Toronto Winnipeg Vancouver St. John, N. B. Halifax, N. S. Sydney, N. S.

lead, the cone belt is called on only to check the speed of the bobbin, or, in other words, the cone belt is at all times holding back and preventing the bobbins from revolving too rapidly. What a difference compared with that of the bobbin-lead!

In the case of the bobbin-lead, the cone belt is called on to drive the sun-gear against the opposite direction of the differential sleeve, besides being called on to drive all the bobbins at a speed in excess of the spindle at all times except at doffing time.

What a mistake! Some of us are beginning to see what it has cost the industry. It has made what is known as unequal conditions on fly frames. This means that the direction in which the pad points and the pressure conveyed to the paddle condenses each layer, and for this reason it is impossible to have cones of proper outlines to suit all speeds.

The flyer-lead frame is bound to come back. Then a builder of fly frames can construct a frame to suit all speeds as formerly.

Wash (Mass.).

New Machinery and Trade Notes.

The Purchase of Loom Repair Parts.

Loom supplies and repairs are needed from time to time in all weave rooms. Bobbins, shuttles, pickers, strapping, etc., are in constant use and their service depends first upon the quality of the goods and second upon the care given them.

On the item of bobbins the DRAPER COMPANY have everything needed to insure the best quality both as to material and workmanship. Some twelve years ago, finding they were not properly keeping up with deliveries, they purchased large tracts of land in New Hampshire to the extent of over 30,000 acres, including in the purchases several valuable water privileges and on one of them erected a plant for the manufacture of bobbin blanks, including the necessary houses for proper seasoning.

They also built a large addition to their wood-working shops in Hopedale and installed an equipment of bobbin finishing machinery. This equipment has been increased from time to time and prompt service in filling orders may be expected.

In oiling their bobbins genuine linseed oil is used, which remains in the wood when dry, and in finishing pure gum shellac cut in alcohol is used.

Northrop loom shuttles are also made under their own supervision and a stock of finished shuttles of regular patterns is carried in the works at Hopedale and at the southern supply department in Atlanta, Georgia.

Northrop looms, like all others, call for more or less repairs. With the wear and tear incident to the various motions in all looms, the wonder is, not that they call for repairs, but that they call for so few. These repairs may be either to replace wear or breakage. The parts that wear out are mostly those subjected to continuous motion, and they may be secured from the DRAPER COMPANY. The parts which break and call for replacement are comparatively few in number.

The breakage in the Northrop loom is generally due to lack of proper adjustments; in such cases if there is an interference between moving parts that can not be provided for by use of springs or other alternatives the manufacturers have designed the groups of pieces that compose the mechanism so that the breakage is obliged to take place in the least expensive piece and the one that will do the least damage to the loom. For instance, in the operation of transferring the bobbin, they have intentionally made the piece called the bobbin support of such proportions that it will be the first to break if a bobbin is caught; this avoids the possibility of breaking the filling battery stand, the breast beam, or the loom side. The apparently weak place in the bobbin support acts as a safety valve to prevent the breakage of parts much more expensive both in purchase price and in application. An illustration of the false economy of making the bobbin support stronger was recently reported by a mill that bought some loom repairs made of malleable iron and claimed by the maker to be much superior to grey iron, as they would not break. An accident occurred that would have simply snapped the bobbin support as designed, but in this case the malleable iron held and the breakage was transferred to the loom side, thereby multiplying instead of reducing the cost of repairs. This illustrates only one of the numerous cases that have been carefully considered in our designing department where certain pieces have been intentionally made to break first in emergency.

As to the use of malleable iron in loom parts, this has been given consideration, and careful tests have proved it to be a very unsatisfactory material for this purpose. It bends easily, throwing devices out of adjustment and castings do not duplicate the pattern as accurately as in grey iron. Wherever grey iron is suitable it is used and when more strength is required, drop forgings are used.

The maker of job loom repairs has no interest whatever in the customer beyond the sale of some malleable or other castings, and naturally his only claim for the business is that of cheapness in price and strength in the parts furnished. Do not forget that when these strengthened parts drive breakage into more expensive pieces the so-called cheap repairs are a liability rather than an asset.

The UNIVERSAL WINDING COMPANY, Providence, R. I., makes the following vacation announcement: "Our works will be closed the week of August 17 to enable us to give our employees a vacation, and to adjust inventories disturbed in moving into our new plant. Parts shipments urgently needed by our customers will be filled from stock, but no machine shipments will be made.

William Firth, 200 Devonshire St., Boston, Mass., advises that the rumors that this firm has given up their importing business were unfounded. It is also stated that Mr. Edwin Barnes, who has been connected with this company for the last 15 years, is no longer in their employ.

RU-BER-OID
PRONOUNCED "RU" AS IN RUBY
ALWAYS SPELLED WITH ONE B.

RU-BER-OID is the original flexible, prepared roofiing. Its introduction, in 1892, followed years of experimentation, in which The Standard Paint Company employed the most skilled chemists of America and Germany. This opened a new era.

For the first time a ready-to-lay roofing was offered, which was free from the disadvantages of tar roofings, and which would not run under the most severe heat or crack with extreme cold. Its serviceability is vouched for by the fact that the first RU-BER-OID roofs applied in 1892 are still in good condition, still serviceable and weather-proof.

KA-LOR-OID (Colored Ruberoid) came later, and possesses all the enduring characteristics of RU-BER-OID with the added feature of permanent colors worked into the best felt roofing procurable. The only secret lies in the process of making RU-BER-OID Gum. This Gum is water-proof and flexible as new rubber. Yet, unlike rubber it retains these qualities when exposed to the elements. Rubber rots after slight exposure. RU-BER-OID and KA-LOR-OID retain their life and flexibility under the severest weather conditions.

Critical facts for the Buyer of Roofing

We originated, and have kept on improving

RU-BER-OID and KA-LOR-OID (Colored Ruberoid) contain no rubber or tar. They are not "asphalt" roofings. They may be used on roofs from which drinking water is gathered without affecting the water in any way.

They are effective insulators, and exclude both heat and cold. They are fire-resisting. Hot coals thrown on them do not set fire to the roofing or to the sheathing beneath.

A lot of interesting information (with comparisons of various roofings) will be mailed on receipt of postal asking for Book 191.

The Standard Paint Company

100 Williams Street, New York.

ATLANTA BOSTON CHICAGO DENVER

For Leaky Cellars & Pits
IMPERVITE
is GUARANTEED to Waterproof

Announcement.

One of the effects of the European war and one which affects many manufacturers through their supply department is the threatened advance in the price of brushes due to the restricted supply of bristles, hair and tampico. The manufacturers of the well known "Felton" brushes, viz: S. A. FELTON & SON CO., of Manchester, N. H., and D. D. FELTON BRUSH CO., of Atlanta, Ga., have recently made the following announcement:

"Brushes are made from bristle, hair or tampico, the greater part of which are necessarily imported. The United States produces very little bristle, the length of which is short and quality soft. Owing to the suddenness of the European war, the supply of bristle and hair in this country is extremely small, practically all of which has been purchased during the past week. There is some afloat and some in foreign ports, but as to when it will reach this country no one can tell. We have purchased a considerable amount of stock, but at greatly advanced prices. This is to notify you that we naturally will have to ask an increase in price for our brushes, consistent, however, only with the advance which we have been obliged to pay for raw material. This latest complication combined with troubles which have been experienced in importing tampico from Mexico during the past year, has resulted in a situation that the brush manufacturers of this country have never before had to face. For the present we must refuse orders at previous quotations and withdraw all existing prices. You may rest assured that we shall endeavor to look after our customers' wants to the best of their advantage, as it is not our intention to exact any additional percentage of profit other than sufficient to cover the increase in cost of material."

THE YOUNG MAN AND THE ELECTRICAL INDUSTRY is the title of a story written by James H. Collins, the well-known magazine writer, which has just been issued by the WESTINGHOUSE ELECTRIC & MFG. COMPANY. The little book deals with the opportunities afforded a young man in this industry and the different lines in which he may direct his activities as exemplified by the works of the WestinghouseElectric Company. The Company announces that it will supply a copy to anyone interested in the development of young men.

THE SEYDEL MFG. CO., of Jersey City, N. J., announce that owing to the European war the importation of all sizing materials and chemicals will be held up for at least 90 days. In the meantime they are prepared to analyze any and all imported articles and duplicate them, insuring the same sizing and finishing results formerly secured with the imported goods.

They are forced to withdraw all quotations on soaps made of palm oil and olive oil, but think that the prices of these oils will return to normal within 60 days.

For cotton, worsteds and unions, the European finish No. 7, made by THE ARABOL MFG. CO., 100 William St., New York City, is highly recommended by its makers who say it gives excellent results in the padding machine, producing an exceptionally full feel. It is odorless and in every respect claimed to be far superior to animal glue.

A Steel Band Positive Drive.

During a five weeks' test in a modern cotton spinning mill in New England, under mill conditions, the BROWN SPIN-WRIGHT COTTON COMPANY has been demonstrating the efficiency of the steel-band drive for driving spinning and twisting spindles. Except for the Brown method of driving the spindles, the frame was the same as the other frames used in this mill. It was a 240-spindle frame and ran 8,500 r. p. m. on 40's. With the Brown system of driving, each spindle is fitted with a sprocket, or gear, in place of the usual whorl, the sprockets meshing into an endless steel band which is slotted to receive and drive the sprockets. The band runs in an oil-tight rail, and the oil carried in the latter lubricates the spindles as well as the band and sprockets. At the end of the five weeks' test the driving mechanism was removed and the spindles taken up. There was no perceptible wear on the band or sprockets, and no appreciable change in the spindle bearings, the latter having been kept well oiled.

During this mill demonstration several minor changes were made in the spindle, including a few improvements that were found advisable to fully meet mill conditions. Among these may be mentioned a simple change that makes it possible to stop any spindle when it is necessary to piece up an end. The drive has also been adapted for reverse twist. In all other respects, however, the drive is identical with that which was previously operated in the demonstration rooms of the company at 32 Union Square, New York City. A new frame is now being built involving the latest improvements and designed to run on 30's to 60's warp yarn. This will be installed in demonstrating rooms that have been leased by the company at 1502 Purchase street, New Bedford, Mass. A number of manufacturers have expressed the desire to test their own roving on a frame of this kind, and opportunity will be afforded to any who wish to make such tests under their own supervision.

This drive consists of a steel band, 1½ inches wide, running over gears on the spindles, also oiling them. This band is driven at one end of the frame by a special gear, and runs over idler pulleys at the other end, giving a positive drive for every spindle. The Brown drive puts the same number of turns of twist into each inch of yarn delivered, and, as there is no slippage, the maximum of production is achieved at all times.

Another important advantage is the freedom from flyings which accumulate around the spindles and rails under the present system, and such accumulations are frequently caught up by the yarn, causing slugs and bunches.

The Brown drive is enclosed and easily cleaned. The steel band drive automatically oils itself as well as every spindle on the frame. The idle pulleys over which the band passes run in a bath of oil, and the band carries this oil to all the spindles.

Each spindle may be readily stopped to permit the tying up of ends, or may be disconnected and removed without interfering with the running of the other spindles on the frame.

GLENLYON DYE WORKS

(Yarn Dept.)

CENTRAL FALLS, R. I.

FRANK A. SAYLES, Lessee

Bleachers and Dyers

OF

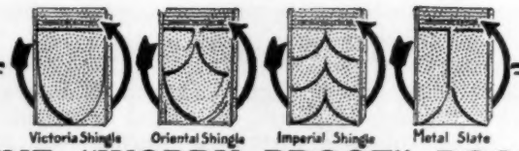
Cotton Yarns in Ball-warps and Skeins, Silk and Viscose Silk

SPECIALTIES: COLORS FAST TO BLEACHING, Mercerizing, Laundering, Cross Dyeing and Light. Dyed Novelty Effects in Fast Colors. High Grade Bleaching of Cotton Warps and Skeins. Silk Dyed Fast to Boiling Off and Bleaching.

Insist on Having

"GLENLYON DYED YARNS"

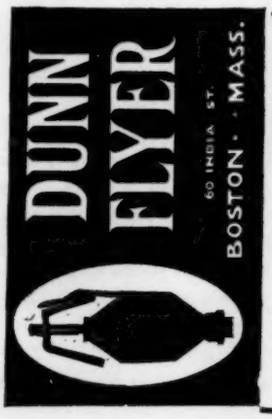
Safest and Most Reliable in the Market.



THE "WORRY PROOF" ROOF

That means proof against rain, snow or windstorms and fire. Such a roof is made by Cortright Metal Shingles.
Besides they meet every building and insurance requirement, and if occasionally painted will last as long as the building without repairs.
They are adaptable to any size or style of building, being handsome enough for the most pretentious home, yet inexpensive enough for the smallest cottage.
They mean increased building values with practically no increased expense.
Getting full information about Cortright Metal Shingles will not obligate you in the least, so write us today.

Cortright Metal Roofing Co.
Philadelphia and Chicago.



PERFECT BALANCE.
NO CHANGING SLOT.
TWIST RETAINED.
A " DOG DAY" FLYER

MORE AND BETTER ROVING
LESS DOFFING, HANDLING, SETTING IN, PIECINGS AND WASTE.

Costs No More
Makes and Saves You Money.

DUNN FLYER CO.
60 India St., Boston, Mass.

The "1912" Cloth Cutting, Folding and Winding Machine

This machine will cut down operating expenses. It does in one operation the work which is now being done in two. Is cuts the cloth, folds the edges and rolls them up in one operation, and at all times gets one more strip out of a bolt of cloth than is possible with the old method of cutting. At the same time it measures the bolt of cloth to show the manufacturer whether or not he is getting the number of yards he is paying for. With the high price of cotton to-day every knit goods manufacturer ought to look into this to see if he is getting the maximum efficiency at the least expense. You will find when you come to figure it up in the course of a year that the labor it saves is a big item.

Also have other labor-saving devices, and upon application you can get prices and full information on same.

J. A. FIRSCHING, 50 John St., Utica, N.Y., U.S.A.

Clinton H. Scovell & Company

Certified Public Accountants
Industrial Engineers

110 State St. CHS&C CERTIFIED PUBLIC ACCOUNTANTS Boston, Mass.

Textile Cost Accounting

WATER SOFTENING OR FILTRATION

FOR BOILER FEED AND ALL INDUSTRIAL USES
WM B SCAIFE & SONS CO. PITTSBURGH PA

FOR

SCOURING—WASHING

There is nothing which gives you the soft, harmless, thorough and low-priced results of

Alumina Soapalite

THE MINERAL SOAP

The Electric Smelting & Aluminum Co.
LOCKPORT, N. Y. Sole Manufacturers

DIXIE SPINDLE & FLYER CO., Inc.

Expert Overhaulers and Repairers
COTTON MILL MACHINERY
CHARLOTTE, N. C.

KNITTING MILL NEWS.

Notices of mill projects, additions or improvements are solicited for this department. Other notices pertaining particularly to the Southeastern section will be found in the Southern Mill Situation review.

CONNECTICUT.

ROCKVILLE. It is reported that the James J. Regan Mfg. Co., has approved the plans for a four-story mill 200 by 72 feet to be constructed at its Saxony plant.

DELAWARE.

WILMINGTON. The Comet Mfg. Co., has started operation on the production of men's cotton underwear.

MARYLAND.

Hagerstown. Arrangements are in progress by Windsor Knitting Co., for the rebuilding of its knitting plant recently burned at loss of $50,000. It is understood the new plant will be about same size as one destroyed.

MASSACHUSETTS.

WINDSOR LOCKS. The Medlicott Co., is erecting another addition to its underwear mill. The section of the mill used as a dyeing department is being replaced with a brick building of larger dimensions, having a concrete foundation extending further into the river bed and will be increased in height. This company recently completed the addition of another story to the big storehouse just south of the mill.

MINNESOTA.

MINNEAPOLIS. The addition to the plant of the Northwestern Knitting Co., is nearly completed. It will give the company an entire block. The construction is of brick and reinforced concrete.

NEW YORK.

BROOKLYN. The plant of the Wyckoff Knitting Mills has been moved to larger quarters.

HUDSON. Two large plants of the Union Mills, manufacturing knit goods, situated at Hudson and Mechanicsville, have closed down indefinitely on account of the general war in Europe. This company has been doing a large export business.

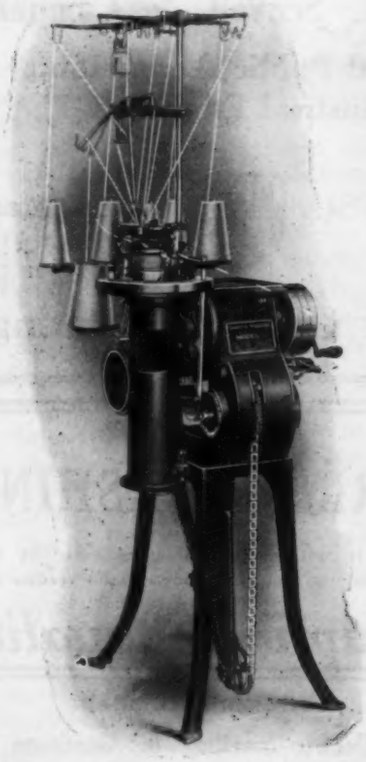
OHIO.

CLEVELAND. The Standard Knitting Co., has made an increase of $100,000 in its capital stock, which is now $300,000.

PENNSYLVANIA.

LEBANON. A. R. Creider & Bro., have purchased 20,000 square feet of land here and are to erect a three-story brick building to be used exclusively as a knitting mill. They will abolish their other plants. This concern will build its own dye house and boiler house, and have secured an option on the building for the manufacture of hosiery and other knit goods.

ROSEDALE. The Rosedale Knitting Co., is the name of a new corporation which has commenced the manufacture of men's full fashioned silk hose. The output averages about 45 dozen per day. Two more full fashioned machines have been ordered and when these are installed the output will be 90 dozen. The company occupies a new brick one-story mill and the machinery is operated by electric power.



Our MODEL F machine not only makes half hose automatically, dropping them from the machine, and effecting a saving of from 7 to 15c per dozen, but **will also make women's stockings** with a knitted turned welt, **saving time, waste** and, consequently, **money.**

Established 1865

Scott & Williams, Inc.,

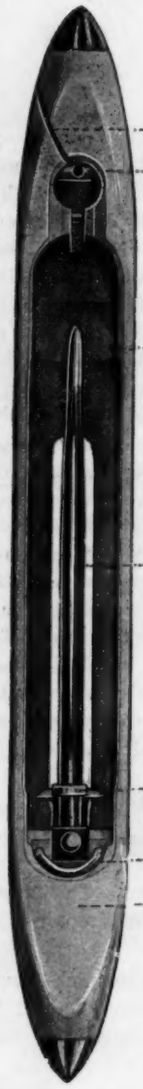
88 Pearl Street
BOSTON

NEW YORK PHILADELPHIA UTICA

To Reduce Weaving Costs

USE SHAMBOW HAND THREADING SHUTTLES

WITH IMPROVED MARBLE SPINDLE


Straight Saw-Cut
Threader Eye is simply a bushing screwed into position
Improved Throat Construction of recent design makes Shuttle the strongest hand threader made
All Split Spindles carefully tempered and of extra durability
Collar of Spindle brazed on to prevent loosening
Patent Protecting Staple prevents splitting of Shuttle at Spindle End
No Top Spring to break-no screw to work loose and catch warp

SHAMBOW SHUTTLES WEAVE BETTER

The straight saw-cut cannot intercept slack warp threads as does the curved cut. The graceful taper facilitates picking of shuttle, especially noticeable where the harness lift is being shortened in increasing the speed of the looms.

SHAMBOW SHUTTLES WEAR LONGER

Our shuttles are so designed to strengthen those parts which are first to give away under the ordinary strains and wear. The wood is carefully selected and seasoned by a slow process, which preserves the natural toughness and resiliency of the wood.

SHAMBOW SHUTTLES PRESERVE BOBBINS

Spindles are set so as to permit easy doffing of the bobbin without clipping the base. Our marble spindle with staple is the easiest on bobbins. Special catches for ringed bobbins.

Shambow Shuttles weave B. V. D. Underwear, Cluett & Peabody Arrow Collar fabrics, etc.

Our Hand Threading Shuttles with Improved Marble Spindles are Weaving over 1,000,000 yards of cloth daily.

Write Today for New Price List.

SHAMBOW SHUTTLE SERVICE

We can re-design your present shuttles to—

1. Accommodate larger capacity filling bobbin.—or
2. Accomplish successfully an increase in speed of your looms,—or
3. Weave uncommon kinds of filling.

May we be of service to you now?

SHAMBOW SHUTTLE CO., WOONSOCKET, RHODE ISLAND

S. C. Lowe With Whitin Co.

The Whitin Machine Works, cotton machinery, Whitinsville, Mass., are to open a selling office in Boston about the first of October, and have engaged Stephen C. Lowe, for nearly fourteen years sales agent in this country and Canada for John Hetherington & Sons, Ltd., Manchester, England, to take charge. Mr. Lowe will make his headquarters in the John Hancock building, 35 Federal street, where he has been located for several years, and will give his principal attention to the introduction of the improved Whitin comber that has been developed by G. Marston Whitin and that is claimed to work a very decided advance in the art of cotton combing.

These machines have been in successful operation in two New Bedford mills for several months, giving largely increased production of superior quality with lessened waste. The detaching rollers are operated without the use of cams, thus insuring smoother and faster action, while other important improvements have been made that are designed to overcome inherent defects of the old Heilmann type. The fact that G. Marston Whitin, of the Whitin Machine Works, personally developed this new comber, and that it was not placed upon the market until he considered it perfected in practically every detail, speaks volumes for its merits and will cause manufacturers to investigate the machine with unusual interest.

It is reported that Mr. Lowe's new position is much more advantageous than any he has held heretofore, and the fact that his principal success when with the Hetheringtons was made with the Nasmith comber is an indication of the faith that he and the Whitin Machine Works have in the new Whitin comber.

The Smith-Drum Co., to Erect New Plant.

THE SMITH-DRUM CO., of Philadelphia, makers of mercerizing and dyeing machinery, are preparing plans for their new plant and expect to start operations at an early date. The property has a frontage on Allegheny avenue of 125 feet, on Lawrence street of 250 feet and 352 feet along the Reading Railroad branch, on the east. In all, 60,000 square feet of space will be occupied, as compared with 14,000 in present plant. The Allegheny avenue front will be given over to offices and designing rooms, while the main shop will be a steel structure, 90 by 250 feet, with two side galleries, 25 feet wide, having a 40-foot clearance in center, which will be occupied by a traveling crane which will reach every part of the main floor and galleries. Modern steel frame windows will be used. Arrangements are being made to supply the plant with the latest equipment and the product will be up to the highest standard as is usual with all Smith-Drum machinery.

THE BAYER COMPANY, INC., 117 Hudson St., New York City, are sending to the trade the following color cards: Chrome fast orange R. D. Paste; Benzo Fast Gray B. L.; and Monopole Brilliant Oil. These color cards give characteristic features, dyeing recipes, and other data of interest to the dyer and finisher. Copies may no doubt be obtained on application to any of the branch offices of the Bayer Company.

A. S. Fuller to Represent Hetherington.

JOHN HETHERINGTON & SONS, LTD., the well-known cotton machinery builders, of Manchester, England, announce that A. S. Fuller is to succeed Stephen C. Lowe, as their agent in this country and Canada. Mr. Fuller has a wide acquaintance among cotton manufacturers in this country, having been associated with the Hetherington office here as mill expert for two years. His business career has been almost wholly with this company in their shops among European mills as a fitter and as a salesman and expert abroad and in this country. He has had opportunity to obtain an intimate knowledge of cotton machinery and manufacturing. He has a large circle of friends among the trade in this country who will be glad to hear of his advancement.

An International Crisis.

Almost without warning the civilized nations are facing a crisis deemed by most men impossible. The strongest and best armed of the world's nations are at war. Commercially, there is an unprecedented break-down. In the dyestuff trade the source of supply—Germany—has for the time been wholly severed from the American consuming trade. Dependence must be placed upon stocks on hand or undelivered on the water. The CASSELLA COLOR COMPANY has always followed the principle of keeping in America supplies for all reasonable emergencies and it believes that with a little patience on the part of its friends, every reasonable need can be cared for. Close observers have held that the contest can not be of long duration—the forces are too great—the power at the command of each too tremendous. Assuming this to be so, textile interests which are stocked with colors, reasonably may expect to weather the difficulty and if all will limit their demands to actual needs, no hardship should immediately come to any. No advance will be made in price to customers for deliveries from stocks on hand. The goods themselves are but part of the service which this company renders to the textile trade, and a crisis such as the present only accentuates the fact that they are here to protect those whose interests have been placed in their care.

THE GRATON & KNIGHT MFG. CO., of Worcester, Mass., have recently opened a branch at 301 Magazine St., New Orleans, La., where they carry a complete line of leather belting, lace leather, belt dressing and cement. This branch is also equipped to handle all kinds of belt repair work promptly and satisfactorily.

This new branch simply emphasizes the complete service organization of the Graton & Knight system. One of the strong features of this service is their insistance on their customers absolute satisfaction.

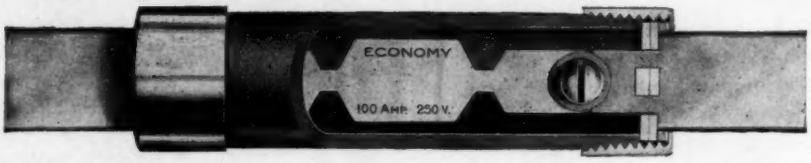
The territory covered by the New Orleans branch is the entire state of Louisiana and the southern part of Mississippi, everything south of Jackson and Meridian, including these two cities.

The Naumkeag Steam Cotton Company, Salem, Mass., have placed their order for the humidifier equipment for their new weaving mill with the AMERICAN MOISTENING COMPANY, Boston, Mass. This will be a standard, up-to-date equipment of atomizers, specially designed for this mill.

SAFETY FIRST
ECONOMY renewable cartridge FUSES

In these days of retrenchment it is necessary to run your plant at the maximum efficiency, saving money wherever possible.

ECONOMY renewable cartridge FUSES



cut the cost of annual fuse maintenance 80 per cent—and provide accurate electrical protection under all conditions. This has been proved in large industrial plants, central stations, department stores, isolated stations—in short, wherever Economy renewable cartridge Fuses are used.

Economy renewable fuses are made in both knife blade and ferrule type. A recently developed "Drop Out" Renewal Link eliminates the use of filling material of any kind and assures successful operation under all conditions.

To Owners, Managers, Superintendents, Chief Electricians, Chief Engineers:

We will gladly send free enough Economy Fuses, (ferrule or knife blade types), to convince yourself of the big saving effected by their use. Mention amps. and volts desired. Ask for Catalog 7.

Economy Fuse & Mfg. Co.

Kinzie and Orleans Streets, CHICAGO

BOOK REVIEWS

All Books Reviewed Under This Heading May Be Procured From COTTON at the Published Price.

TRAFFIC GLOSSARY. By R. E. Riley, Instructor in Interstate Commerce, LaSalle Extension University, Chicago. 136 pages. Bound in heavy paper. Price, $1.00. Published by LaSalle Extension University, Chicago, Ill.

In the literature of transportation and in traffic work such as arises in the practical experience of every textile mill shipping office, there are many terms of a very technical nature. In the past it has been difficult for the student of the subject or the practical worker to obtain convenient, reliable and clear information as to these terms. This Traffic Glossary has been published expressly to obviate these conditions. Its author is a man of wide traffic experience and the book itself a valuable ready reference on many questions that arise in the work of the traffic clerk of every large mill.

The book is divided into four sections. One section gives definitions of traffic territories; another, definitions of traffic terms and abbreviations; a third treats of the application of classifications; and the last consists of suggestive test questions. It has been prepared primarily for use in connection with LaSalle courses and is the first comprehensive work of its kind.

As an example of the use of the glossary let us assume that in reading, some reference is made to Western Termini or S. U. L. C. L. (set up in less than carloads) or reciprocal demurrage or any number of similar technical matters. A reference to the glossary will quickly explain the meaning of any such terms.

THE WAR MANUAL. In the World's Work for September. 136 pages. 100 illustrations and maps accompanied by a complete index. Price, 25 cents. Published by Doubleday, Page & Co., Garden City, N. Y.

The World's Work for September, 1914, is entitled "The War Manual," and contains facts everyone wishes to know about the causes for the European war, the armies, navies, finances and principal characters of the countries involved. Among the special articles prepared for this issue are Why the Nations Fight; The Alliances that Made the War; A War Correspondent's Impression of the Fighting Armies; The Armies of Europe; New Things in War; Austria's Civilizing Mission; Europe's Food Supply in War Times; The Red Cross of the Waring Nations; The Effect of the War on the United States; A Chance for American Shipping; Financial Aspects of the War; Rights and Duties of the United States as a Neutral; and many others. The illustrations are excellent and the entire compilation is a timely one which will be read with interest.

W. A. Graham Clark, who has for a number of years been commercial agent of Department of Commerce, but was recently appointed their southern representative, has opened an office in Room 224 Postoffice Building, Atlanta, Ga., where he will keep in touch with manufacturers of export goods and render any advice and assistance possible.

Business Prospects Improving.

THE CLINCHFIELD FUEL COMPANY, of Spartanburg, S. C., advise that they have recently closed a contract with the United Fruit Company for a term of three years to furnish Clinchfield coal to its entire fleet of steamers plying between Galveston and tropical ports. They have also been awarded a contract by the War Department to supply Clinchfield coal exclusively to the transports now at Galveston for use in carrying troops to Mexico. There are about 13 or 14 steamers in the transport fleet. Galveston shipments will move by way of Hampton Roads until the Charleston facilities are ready.

Their engineers have submitted plans for storage arrangements at Galveston, and hope to commence work thereon immediately. It will be necessary to carry at Galveston a stock of from 10,000 to 25,000 tons of coal to meet the demand, and they will have barges mechanically equipped to rapidly place coal into bunkers of steamers. Plans for similar arrangements at Savannah have also been worked out by their engineers, and they hope to commence work thereon in a short time. They also have contracts made this year with about 150 different steamship lines for furnishing Clinchfield coal for bunker use at Savannah and Galveston.

When it is remembered that this is their first year in the tidewater trade with Clinchfield coal, the progress made is very gratifying. In addition to the business mentioned, a shipment has been made to South America, and they are negotiating for the sale of Clinchfield coal for movement to European ports. The opening of the Panama Canal will doubtless give American coal a decided advantage in the South American markets as well as in the Canal Zone, where a very heavy tonnage will be used annually for bunkering steamers.

In the meantime their general sales for industrial and railroad purposes have been very satisfactory. Their contracts exceed 2,000,000 tons, which is a larger amount than they have sold in any year since beginning business; in fact, sales this year are nearly 500,000 tons in excess of those of last year.

They report a very good movement of coal, notwithstanding general conditions, and their mines are now running full time.

ALLIS-CHALMERS MFG. CO., Milwaukee, Wis., are mailing copies of catalogs Nos. 100 and 103. The former illustrates attrition mills, stamp mills and accessories, concentrators, amalgamators, and a complete line of power plant and electric generating and transmitting machinery and equipment.

The latter, No. 103, illustrates smelters, blast furnaces, cupolos, ladle cars, hand and power operated blowers, mine and other dump cars, scales, wheelbarrows, converters, accumulators, heating furnaces, rolling mill and other engines, electric generators and motors, blowing engines, gas engines, turbines, pumping engines, cement mill machinery, etc.

These books, which are printed in the Spanish language, are 8 x 10½ inches and contain 135 pages each. They are handsomely printed and illustrated and are bound in very substantial and attractive covers.